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A City Health Officer Looks at Public Health*

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IN 1873 the American Public Health Association held its first scientific meeting. Since that year our Association has been a guiding force in modern public health progress. The program of the A.P.H.A. is based on the advancement of public health knowledge. Our public health practices are conceived as educational measures and compulsion is restricted to a minimum. Such a program can develop only in countries where thought is free and a spirit of humanity prevails. Our public health point of view is fundamentally the same as that of our friends in the rest of the Western Hemisphere, in Great Britain, and in the other free countries.

When our Association was founded epidemics of smallpox, cholera, yellow fever, typhus and typhoid occurred with distressing frequency and were our major concern. These problems have receded into the background, but the danger from epidemic diseases is greatly increased during times of disaster. Hence, while there should be no relaxing in our control measures against these and other communicable diseases, we must in addition concern ourselves with problems of a different sort.

It has been 14 years since a *city* health officer has had the honor of delivering a presidential address before the A.P.H.A. For 24 years I have worked full-time in our chosen field and for 20 of those years it has been my privilege to be on the firing line of a city, county, or state health department. From this background I have been privileged to see the forward march of public health.

I have seen something of the earnestness, enthusiasm, and productiveness of many public health workers—health inspectors, laboratory assistants, nurses, and health officers, these last working sometimes alone in their communities.

I know something of the miracles of public health, such as the substantial elimination in many communities of diphtheria and typhoid fever, the striking reduction of tuberculosis and infant

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mortality, the vigorous and fruitful attacks on malaria and hookworm disease, the cleaning up of water and milk supplies, the building of effective sewage disposal plants, the change from the mere custodial care of records of births and deaths to the statistical use of these as direction finders. Epidemiology has replaced magic, and public health nursing has come of age. Schools of public health have produced trained workers to reinforce and stimulate those already in the field. We can all take pride in these accomplishments.

But we cannot live in the past. We are now passing through desperately serious times. Great issues of human destiny are at stake. We cannot face these conditions complacently. Now, more than ever before, public health workers must assume new responsibilities and be ready to adapt themselves quickly to what may lie ahead.

National defense dominates this country's thinking, talking, and action at this particular period in our history. For the next few years it is essential that everyone be employed in some productive task to supply the needs for defense purposes. This can be done only if we have a nation composed of physically and mentally strong individuals. Last week the President of the United States quoted General Hershey, the director of the selective service system, to the effect that nearly 50 per cent of 2,000,000 examined for selective service were found unfit mentally or physically. Action is being taken by the federal government to rehabilitate some of these men. In addition to this immediate program, President Roosevelt said that he would start a long-range program calling for coöperation of the states, cities, and counties, townships and individuals to remedy the underlying causes of the situation. Public health workers are anxious and eager to participate in an effective job of health conservation. Public health is closely interrelated with the rest of the nation's activities. As Mayor LaGuardia, the National Director of the Office of Civilian Defense, has stated:

> While we cannot escape new responsibilities and new problems in an emergency, the federal government has made it very clear that there shall be no step backward and no losing of any of the ground that has been gained in public health and economic security and social welfare. Therefore, the government itself, in its normal public health work, will continue, if not increase, its efforts, and the same is applicable, of course, to state and local health departments.

Recent events have presented us with a new problem in connection with community health protection. I refer to the matter of priorities. When a water main in a building breaks, when a sewer line in an apartment has to be replaced, when the heating aparatus breaks down, when any of these or other related accidents occur it is vital that repair and replacement materials be promptly available. Health laboratories have certain items that are indispensable for water analysis and for the detection of disease.

While concessions will have to be made regarding substitute material, items of first importance for the protection of a community's health should go to the top of the list of essential needs. The A.P.H.A. should give its support in this situation. I am not referring here to materials for construction of new health buildings which are not in the same category.

National defense is a powerful additional reason for intensifying and extending our public health program and for rigorous self-analysis of our work. Let us then turn critic and put our public health program under the microscope, not to make it look larger than it is, but to see more clearly its weak points. Let us deal with the main phases of our public health program, namely:

1. Some of the *responsibilities* of

official public health agencies in the light of present conditions and present-day knowledge.

2. The need for curtailment of non-essential activities.

3. The importance of sound business administration in our health department work.

1. RESPONSIBILITIES AND OPPORTUNITIES

In considering the *health department's specific responsibilities and opportunities*, the following three possibilities present themselves:

a. We can continue within the narrow confines that have been set by the customs of the past.

b. We can override all boundaries and take the stand that almost every human activity is related to health and set our stakes on the far flung horizon.

c. We can expand our program into those *newer* fields where health returns can be expected in abundant measure and also increase the emphasis on promising activities to which in the past we have given and are still giving not much more than lip service.

This last course would seem to me to be the wisest one to follow.

Here are some of the items:

Tuberculosis control for over 30 years has had our wholehearted attention, but the fight is not over. The time has arrived when our plans must be directed not only for the "control" of tuberculosis but for its eradication. In many parts of the country diphtheria has practically disappeared. It is possible to get the same results with tuberculosis.

Real progress has been made in the field of syphilis and pneumonia control, but we must continue to increase our efforts. Wherever intensive syphilis and pneumonia control activities are carried on, the results prove significant and effective.

The aging of the population, the marked reduction in the more serious communicable diseases of childhood, and the advances in medical and sanitary science, have had an enormous influence on the character of present-day health problems.

Today about 7 per cent of our population are 65 years of age or over. It is estimated that by 1980 more than 14 per cent of our population will be in this older age group. Hence there is a steady increase in the prevalence of diseases peculiar to later life, such as cancer, heart and arterial disease. Most of these diseases still baffle science, both as to prevention and as to cure. The greatest present need is for an increase of research facilities and efforts in this field.

The funds of philanthropic agencies concerned with the advancement of knowledge are diminishing. It is therefore necessary for official agencies to recognize that they have to assume greater responsibility in public health research. The federal government through the U. S. Public Health Service has assumed leadership in research work in various fields including cancer. For the first time, this year the government of the City of New York has appropriated substantial funds, not only for putting its public health research work on a solid foundation, but also in order to assume a greater responsibility for it in the future.

Of the diseases of later life, diabetes is definitely controllable, and official agencies should make available insulin and treatment to those unable to secure them otherwise.

If one looks at the list of major causes of death from the standpoint of presently available knowledge as to prevention, accidents stand out above all the rest, not only because of their numbers but also because of the toll they take among the young and those in the most productive years of life. In August of this year the President of the United States called upon the National Safety Council to mobilize its nation-wide resources for an intensive safety educational campaign. The American Red

Cross, police departments, and other agencies have taken a hand in this work, but health departments must also play an important rôle in this field. If we in health departments support the work on accident prevention with the same enthusiasm and determination that we brought to diphtheria prevention, we should and can get comparable returns in lives saved.

Along with a renewed interest in accident prevention and control should go active leadership and extensive participation in training for first aid and for home care of the sick.

The high school boy gets returns from his work in algebra, but I would hazard a guess that some of this time devoted to training in first aid would on the whole fit him better to add to human well-being and happiness. The high school girl gets some intellectual growth from her years' work in French, but I venture to suggest that the same time devoted to a course in the home care of the sick might well make her a more useful citizen and mother. These are items coming within the province of departments of education, but health departments should take the initiative in seeing to it that they receive the proper attention.

The importance of nutrition is being forcibly brought home to us in connection with national defense. It is now recognized as a necessity for the soldier, the sailor, and the airman. If it is a good investment for them, why should it not be equally so for all the people?

The prerequisite for good nutrition is a society in which every individual can have sufficient food. But science has also well demonstrated that access to ample food is not enough. The kinds of food that people consume is also equally important. If the food supply is inadequate in amount an added reason is presented for the utilization of the proper kinds of food. This is especially true in view of the fact that we may have to curtail the consumption of certain foods in order to supply our friends abroad.

It is now well recognized that, in spite of our total food supply, the number of persons who are inadequately nourished is very much larger than it need be. Here is a great opportunity for health departments to expand their programs. But in tackling nutrition, we should remember that, however important, it is not a hobby on which to take a ride, nor a solution of all of life's problems. Let us be guided by common sense and demonstrated facts, and a sense of proportion.

Slowly we are beginning to realize the relationship between good housing and health. Other agencies have taken the leadership in slum clearance and in the provision of good housing. It is not too late even now, because of the magnitude of the undertaking and the need from the health point of view, for health departments to concern themselves much more actively with this subject.

Mental hygiene, while a most complex problem, from which many of us shy, offers health departments further opportunities.

Few health departments have taken an active part in industrial hygiene. Yet this is a fertile field, especially now in connection with defense industries and the training of new workers.

For years health departments have embodied dental hygiene in their programs. I hazard the guess that no official health agency would claim that it has more than scratched the surface in this field. Before we can expect to get our dental programs on a basis where far reaching results can be anticipated, extensive and intensive scientific research is needed.

2. CURTAILMENT OF NONESSENTIAL ACTIVITIES

Turning now to the curtailment of

nonessential activities, let me give a few specific examples of activities which fail to yield returns. For years health departments have devoted a substantial amount of energy and money to the so-called control of measles. I know of no authentic evidence to indicate that there has been any real control of the spread of this disease. Almost every individual of 16, at least in urban areas, has had measles in spite of our efforts. And yet for years we in New York City, as well as other communities, excluded from school the family contacts to cases of measles. The New York City Board of Health has recently authorized the discontinuance of such exclusions, and the adoption of this change it is estimated will add $300,000 a year to the funds of the Board of Education in state allowances based on attendance.

We are perhaps afraid to unteach the people what we have taught them for many years. True, something can be done to prevent *deaths* from measles in infants and preschool children. Here is the area to which our work may well be limited until science brings us new weapons for general control.

The public believes, and I am afraid we have led them to believe, that we have considerable power in the control of influenza and poliomyelitis, when as a matter of fact the procedures that we now employ for these two diseases are of *no* demonstrated value. In German measles and chicken pox far too much ineffective energy is being wasted for fear the public will interpret our lack of action as wilful neglect rather than lack of scientific knowledge.

In the case of whooping cough, more facts are needed before we can serve a very helpful purpose.

Our programs of milk control need looking into. Probably too much effort is being placed on inspection of dairy farms and too little on the collection stations and on the pasteurizing plants. In many communities we have reached a point where the quality of the milk supply is such that the health department no longer needs to spend its time in setting and enforcing standards for different grades. Rather, the health department should spend its time in making sure that *all* milk offered for sale is *safe*.

If further reductions are to be expected in infant mortality we should deal much more effectively with the health problems of the expectant mother, her delivery, and the premature infant.

Health education is now in the forefront of our program. But in order really to modify human conduct in matters of public health we must make more use of the rifle than of the shotgun. The quality of our leaflets and annual reports is improving. But on the whole a great deal of our "literature" is still poorly distributed, many of our radio broadcasts still fall on dead air, and our lectures reach comparatively few. Not only more money, but more thought needs to be devoted to *quality* of work.

The public health nurse is one of our great educators and we must have more. But we have neglected to make available to her one of her greatest opportunities for effective education. If bedside nursing were a part of her work in the health department, she could do a more telling educational job as well as render a greater service. I realize, of course, that this may not prove simple in practice. But it is one of the problems which should receive our most careful consideration.

The physician is potentially the greatest of health teachers. The health department is not competing with him; it is working with him for family health conservation. Thousands of family physicians are doing a bang-up good job in personal health education. But how much are we in health departments actually doing to assist the doctors in their health educational work?

I agree with those investigators who state that much of our medical service for school children has failed to yield adequate returns. The sooner we can develop a common understanding and a clear allocation of responsibilities as between the school teacher, the nurse, the school doctor, and private physician, the better the results will be.

The health department should not only accept *community leadership* in public health but it should *insist* on having it. This cannot be done if the official agency is weak and the non-official agencies are strong. The health department on the other hand can only maintain its leadership if it recognizes that the rôle of the voluntary agencies should be to supplement and support the official health agency.

Let us evaluate rigorously present activities and eliminate nonessentials and those that are not yielding results from the public health point of view, regardless of old customs or precedents.

3. SOUND BUSINESS ADMINISTRATION

And now to the third point, namely, the importance of sound business administration. The time has passed when a health department riddled with political and commercial pressure, manned by vote-getting but untrained workers, can hold public confidence. The American people know, understand, and demand health guidance and protection. They ask that their health department be free to go forward without political interference either as to its personnel or its activities. You know, and I know from my own experience in New York City during the past seven and a half years, that an honest city, state, or county health administration backed by an awakened public can make sure that the health department and politics part company. If this can be done in as large a city as New York, it can be done anywhere.

The health department should not be housed and equipped as the stepchild of municipal government. Housing facilities and equipment should be at least on a par with other governmental departments. Adequate funds and facilities should be made available in recognition and encouragement of work that is done efficiently, economically, and fruitfully.

The grants-in-aid to states and cities from the federal government have effectively aided our work. It is our job to see that such funds are used wisely and economically.

The sins against sound business administration cannot be covered by the cloak of scientific acumen. Effective business practice is as important in scientific health work as in any other administrative work.

Personnel should not only be qualified for the various tasks but steady and adequate production should be insisted upon to merit tenure and security.

The application of a merit system for public health workers, in which the A.P.H.A. is playing an important rôle, makes for better service and better returns on the money invested.

However, it is not enough to employ trained workers and assign them to tasks for which they have special aptitudes. Neither is it sufficient to see to it that a full day's work is done. The health department should have a personnel training program to keep the staff up-to-date. Public health science is constantly changing and improving in facts and technic.

To sum up, health departments must assume leadership and responsibility for a broader field of public health. Our job should be something more than preventing disease and reducing death rates. Good health, not mere survival, is of the greatest importance to mankind. Happy and wholesome living should be our goal. The success of our activities for the attainment of a maximum of health for the people will depend upon

wise planning, efficient operation, and constant employment of practical measures.

There cannot be and there must not be any blackout in public health either now or in the future. Despite wars and threats of social chaos, our modern public health campaign for better, healthier, and more civilized lives will go forward if we all work and fight for it. The American Public Health Association, I am sure, will be in the future, as it has been in the past, a most powerful factor in this fight.

MEMBERSHIP ROLL CALL—NOVEMBER 11–30, 1941

Protection of Children in Great Britain in Wartime*

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PLANS for wartime protection of children in Great Britain were started at least 2 years before the declaration of war. The preparation of plans for the evacuation of children from areas of danger was begun 16 months before war was declared. Throughout this long period of planning and during the 2 years of war which have followed, there has been progressive improvement in every phase of the work—health, welfare, education, and recreation—whether in the bombed cities or in the relatively safe areas to which evacuated children have been sent. National responsibility for protecting children was shared by the Ministries of Home Security and Health and the Board of Education. The doing of the job fell to the local authorities.

When the Mission on Civil Defense visited Great Britain in February, 1941, war had been under way for a year and a half and London and other cities had experienced 6 months of bombing. By this time it had become clear to almost everyone that life in a great city under bombing was no place for children. Actually more than 80 per cent of all London children had been evacuated and were being taken care of outside the city in many hundred towns and villages. The latest report from the Ministry of Health in London indicates that in August, 1941, in spite of 3 months of quiet, only 170,000 children, out of a normal total of about 700,000, remained in the city.

IN CITIES UNDER BOMBING

For the protection of those children who were still left in London certain steps had been taken. School buildings had been provided with shelters, and respirators had been distributed to children. Communal feeding centers had been established in 139 places in London where families or groups of school children could go for one good meal a day or from which cooked food could be taken home. Emergency rest centers for families who had been bombed out in the night had been established in every part of the city. Here hot drinks and food were available, cots were provided, and nurses and welfare workers to give immediate help. In strategic places in the city information centers had been organized where advice could be given to bombed-out families as to what to do next.

In February, 1941, bombing was relatively light and only about one-sixth of the population were seeking protection at night in the public shelters. In spite of improvements

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in sanitation and equipment, the attendance of nurse and physician, and the provision of hot soup or cocoa from the canteen, shelter life was at best an unwholesome and wholly unfortunate experience for children and young people. Many of the shelters were damp and cold; the opportunity for the spread of infection was great. Life in the shelters was one of the most potent arguments for a policy of evacuation of children from any area where to be physically safe people feel they must seek refuge underground.

In February, 1941, the usual school medical services and child welfare clinics were in operation in London, though somewhat curtailed in extent. At the outbreak of war in September, 1939, all school and child health clinics had been closed, and school physicians and nurses and all health visitors responsible for maternity and child health services had been automatically relieved of their regular duties and been assigned to the Emergency Medical Services for duty in first aid and other casualty stations. When no casualties and no bombing occurred this transfer of school health personnel was quickly acknowledged to have been a mistake, as was indeed the closing of schools. The need for the regular medical services for children about to be evacuated was most urgent. Almost at once doctors and nurses were recalled from the Emergency Medical Services, school treatment clinics were reopened, and thorough medical and nursing service and follow-up care were offered to all children who remained in the city and were required for those who were being made ready for evacuation.

A round of visits with one of the school medical officers in London to a school where regular medical check-up examinations were being given by doctor and nurse, to a school treatment clinic where minor ailments of all kinds were being looked after, to a special examination center for children about to be evacuated, left no doubt that every effort was being made to give as good care as was possible under the circumstances. To provide satisfactorily for young children seemed more difficult because health visitors had been transferred to the first aid units of the Emergency Medical Services. Child health clinics had been opened, however, in February, 1941, though in some cases in first-aid stations, and health visitors were being released increasingly to return to their usual work with children and maternity patients or to go out of London to help with evacuated children. As in the case of the school medical personnel, there was general agreement that these health visitors should never have been released from their work with children.

Planning for maternity care was the responsibility of the regular maternal and child welfare authorities under the supervision and standards of the Ministry of Health. The Emergency Medical Service provided for emergency hospital care in the cities. The plan provided that normal obstetric patients were to be delivered at home under the domiciliary midwife services or sent to maternity homes established as war measures outside the larger cities under the maternal and child welfare authorities.

During the first year of the war when there was no bombing, relatively few women left the large cities for delivery care and the domiciliary midwife service in the city was greatly overtaxed. When bombing started, however, in September, 1940, the proportion of women seeking care outside London increased very rapidly, until in the last weeks of 1940 only about one-quarter of the usual number of deliveries took place in London.

The success of this maternity care plan is not questioned. In February, 1941, 90 maternity homes were in

operation and 30 more were in reserve. They were nearly all in large country houses equipped well and staffed by physicians and trained midwives to give the best type of care. Women in the last month of pregnancy were sent to neighboring towns to wait either in a prenatal hostel or in a private household. After delivery they returned to the private household or went to another hostel. The large medical and midwife schools have coöperated in this plan and contribute much to its success.

Under the Emergency Medical Services medical care of sick children is provided for emergency cases in the city hospitals, for other cases in hospitals outside the city. Out patient clinics for children in cities under bombing usually remain open. Pediatricians, though enlisted in the Emergency Medical Services for emergency work, give their usual service in children's hospitals and clinics.

The need for increase in the number of child guidance clinics, both in areas under bombing and outside in the towns and counties that are crowded with evacuated children, is very great. Mental hygiene work for children, though recently expanded somewhat, is still far from adequate to meet present needs. To combat the trend toward an increase in delinquency among older children and young people, recreational activities, clubs, and service organizations are being developed extensively. There is a continuing need to help these youngsters overcome the sense of insecurity, the restlessness and the urge for activity, the feeling of freedom from restraint and convention that comes during a "blitz" and results in petty stealing or moral delinquency or other deviations from society's accepted code of behavior. There is no more important social activity for children and young people who must stay in the bombed areas.

THE EVACUATION OF CHILDREN

The task which the British Government set for itself when it undertook to plan and carry out an evacuation of children and mothers from London and other areas of danger proved to be more difficult than was anticipated, and the 16 month period of preparation was none too long to take the necessary steps. By the time war was declared in September, 1939, and the evacuation ordered, registration of children and plans for assembly in London had been completed, transportation schedules for trains and buses were ready, plans for the reception of children in the provinces had been made. The move itself went off like clockwork. In less than 4 days more than 600,000 children and mothers were moved from London and a similar number from other cities. Not a child was lost. Practically all this great multitude of children were taken into private households; a few were placed in school camps, hostels, residential nurseries. All Great Britain had become one great child-placing agency.

The story of what happened next and the return of thousands to London and other cities is only too well known. Most difficult situations were created when a mother and young children from the tenements of London or other industrial cities were lodged with a country family and expected to use the kitchen stove and pots and pans and other household equipment that belonged to the host. At the beginning few people in the reception areas realized that special preparations would have to be made for the absorption of these city mothers and children into the life of the community. Many communities did provide a midday meal for evacuees in conjunction with the school lunch; in some, recreation centers for school children were at once available. All too often, however, mothers with little children from the big cities did not feel at home. They missed the

shops, the "pictures," the excitement of the city. They were not used to the quiet of the country. Their husbands and older children and friends were all back in the city. The school children, too, were homesick and missed the city streets; school was irregular at first; adequate school quarters were hard to find; playgrounds were scarce. Many older boys and girls committed a variety of minor delinquencies largely as a reaction to the insecurity they felt at being uprooted from their homes and the lack of opportunity to "let off steam" in their customary activities. Add to this the absence of any bombing during the early months of the war and the unexpected decision by the Government to collect part of the cost of care from parents or husbands, and the stage was set for the great trek back to the cities. Most of this reaction was not foreseen. Had it been, preparations to meet it could have been made before it happened instead of afterward.

When the British evacuation of children is mentioned here in the United States this is the picture that comes to most people's minds. Somehow the story of the ultimate success of the plan has never been adequately told over here. Few seem to realize that though thousands went back to the cities, especially the mothers with little children, other thousands stayed out in the reception areas, particularly children of school age who had been sent out in school groups under the personal supervision of their teachers. Actually, 4 months after the first evacuation took place there were still more than 400,000 school children in the reception areas. Nearly all these children were living in private families. Any child-placing agency in this country would look upon the care of such a group of children as a Herculean task.

Following the first great evacuation no more mass evacuations were undertaken until after the fall of the low countries in May, 1940; there was, however, a day-by-day movement of small numbers of school children known as the "trickle evacuation," and an ebb and flow between the cities and the reception areas.

It was indeed fortunate that, in the absence of bombing, the authorities had a respite from the difficulties of these first few weeks to give them a chance to work out more satisfactory arrangements before the next wave of evacuees began to move. Until local reception authorities in the counties and towns were actually faced with the task of absorbing into their communities literally hundreds of school children or dozens of families of mothers and young children, they did not realize how hard this task would be. Until the evacuation authorities in cities began to hear the complaints about the condition of the evacuees, they did not realize what a mistake they had made in disbanding the maternal and child health and the school medical and treatment services. Once the need for more extensive preparation was known, it did not take long to proceed to meet it.

In the evacuation areas immediate steps were taken to install a complete system of medical examinations and treatment of minor ailments, with nursing inspections and follow-up, to which reference has already been made. Plans were made also to send out with the evacuees any information already known to the authorities as to the habits and behavior problems of the children.

In the reception areas plans were laid by local authorities with the financial help and advice of the Ministry of Health and the Board of Education to develop a more effective "scheme" for the absorption of evacuated mothers and children into the life of the community. The job was essentially one of community organiza-

tion, involving health, welfare, education, and recreation. Though the responsibility for this job was placed on the local public authorities, women volunteer workers carried most of the day-by-day work. Moreover, with nearly complete responsibility for the planning and execution of programs of work placed in the hands of hundreds of local authorities and only approving powers in the central authorities, it was natural that services for evacuees in different communities would vary greatly in their effectiveness and quality. To have established in a short time a more uniform level of care of children would have required more authority in the central government and a larger staff of trained welfare workers than existed.

As the crisis of September, 1940, approached and the bombing of London and other cities brought about a new and incessant flow of children from the cities, increased advice and assistance was given to local authorities by the Ministry of Health and the Board of Education. Recommendations were made respecting the establishment of community social centers for mothers, community laundries and sewing rooms, recreational activities for school children and youth, nursery centers for young children accompanied by their mothers, residential nurseries for young children sent out without their mothers, maternity homes and homes for the temporary care of children awaiting placement or more permanent care of children difficult to place in private households. Pamphlets on schools in reception areas, on nursery centers, on school meals and communal feeding, on informational service were issued. Local authorities were urged to work out effective methods of supervision of children placed in private homes and to find dwellings where one or more families could live by themselves in their own quarters—not billeted on another family. In addition, school nurses, school physicians, midwives, and health visitors were transferred to the extent possible from evacuation to reception areas. Both central and local authorities were handicapped by a shortage of social workers trained in child-placement methods. Volunteers entered into the work with tireless enthusiasm. Without the great army of women volunteers this program of care for evacuated children could not have been carried forward to success.

The appointment of social workers, recruited from among the child-care workers serving the London school system, first to regional and local health authority staffs, and finally to the Ministry of Health central staff has helped very greatly in community organization for the supervision and care of children and has contributed immeasurably to the absorption of evacuees by the reception areas.

As we review today the whole development of the wartime program of care for children and attempt to analyze the elements in it that have contributed to its success, one factor stands out as important above others, namely, the outstanding, nation-wide program for maternity care and child health that had been developed long before the war began. Ever since 1908, when the first school medical program was started, and 1918, when the maternity and child welfare plans were put into operation, extraordinary advances had been made. Public confidence in the Government's program was great. Child health clinics, prenatal clinics, school medical service and treatment clinics, district nurses, health visitors, and trained midwives were serving the people of practically every borough and town and village. A school lunch program had been developed by about 60 per cent of all local school authorities, with free lunches as needed by about 50 per cent. All this meant that in 1938, when war

appeared to be imminent, the people planning for the protection of children could count on the presence of at least some competent professional health personnel to help with the work in practically every community.

Without this backlog of maternity care and child health service, the British authorities could not have carried out as successfully as they did the program of child care and protection which has been found essential under war conditions. The periods of heavy bombing have sometimes strained these services almost to the breaking point. In cities under bombing well organized services have been difficult to maintain. In the rural areas, child health and school medical services have been taxed too heavily by the sudden arrival of huge numbers of children, and the quality of service to mothers and children has sometimes suffered. But with all the vicissitudes of war, the program continues to function and children and mothers are cared for.

There is much in all this story of how the people of Great Britain have worked out their plans for the protection of children in wartime which could be used by us in this country even today. Our problem is not one of bombing or war. But we do have today large movements of population, even occasionally an evacuation of a small town to give way to some military establishment or industrial plant; we have great numbers of families migrating from place to place in search of work; mushroom towns and cities are growing up suddenly out of tiny communities which to start with were ill equipped to meet even their own child health and child welfare needs. Where originally a population of 1,000 was poorly provided for, today 10,000 may exist with little or no increase in public health nurses, child health or prenatal clinics, hospital care for maternity patients or sick children. In industrial areas we now have problems of thousands of mothers going into the factories, thousands of families living under congested and bad housing conditions. The experience of Great Britain in organizing communities for the great migration of evacuated mothers and children, for care of children of working mothers, is worthy of our close study and adaptation to our own needs.

Many people in this country are still unaware of the fact that we have today no such universal backlog of maternity care and child health services as did Great Britain at the beginning of the war. In only 22 per cent of our rural counties have public authorities made regular child health conferences available to the people; in only 18 per cent prenatal clinics. Even in many full-time county health units the situation is far from satisfactory, for in only 43 per cent is there a child health conference under the health department, in only 39 per cent, a prenatal clinic. Twenty-five per cent of small cities (from 10,000 to 25,000 population) have no child health conference either public or private, 47 per cent no prenatal clinic. At last count there were still 850 counties with no public health nurse serving the rural population. Only about 2 per cent of the cities of less than 10,000 population have an outpatient clinic to which sick children can be referred. School medical services are generally inadequate, especially in respect to correction of remediable conditions.

If we should be faced suddenly with more serious defense situations than exist today and were forced to provide special protective services for children in cities or other areas of potential danger, or to evacuate children and mothers from certain areas because of actual danger, we should be confronted with a task for which we are ill prepared. The deficiencies in child health and welfare services in the smaller

towns and cities would suddenly become highlighted because these are the communities to which many children from the larger cities would be sent. Though there is, perhaps, little reason to believe that any such movement of children as that Great Britain has experienced would ever be necessary in this country, there is every reason why we should put our child health house in better order in all these communities and have ready the blueprints of a plan for emergency action in case it ever should be needed.

With this in mind a small interdepartmental committee on health and welfare aspects of civilian evacuation was recently appointed jointly by the Directors of the Office of Civilian Defense and the Office of Defense Health and Welfare Services. This committee, representing the Bureau of Public Assistance of the Social Security Board, the Public Health Service, the Office of Education, and the Children's Bureau, has been instructed by the appointing officers to study the problem and report on suitable plans of procedure.

Experience with current defense problems has made clear the health and welfare hazards to children that accompany the migrations of large numbers of people. These hazards would be far greater in the case of an evacuation of any considerable number of children and mothers resulting from military action unless careful plans had been made in advance and the supplemental facilities and services that would be essential to meet the needs of evacuated persons in reception areas had been provided. Fortunately in any preparations that are made today for defense no steps need be taken that will not contribute to the health and welfare of children in normal times, no step need be wasted effort, even though at the moment directed toward defense rather than toward normal orderly progress in the child health program.

Study of Home Accidents: Their Public Health Significance

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WHAT is known about the character, frequency, cost, and prevention of home accidents—their where, how, and why, so to speak? What constitutes the responsibility as well as the opportunity of the department of health in this field?

The main body of this paper (and the chief reason for its preparation) is a summary now available of a special analysis of home accidents as studied and reported upon by a visiting bedside nursing service—the salaried service staff of the Metropolitan Life Insurance Company. This study extended over a 12 month period, from April, 1940, to April, 1941. The results are interesting, and throw some light on the "epidemiology," so to speak, of home accidents; they also indicate ways in which the visiting nurse can participate constructively in home education aimed at the prevention of accidents and their costly sequelae.

As a background of this current study, a brief reference will be made to certain other recent inquiries, stressing their principal points of emphasis, comparing past findings with current ones, and pointing out where the present Metropolitan study differs from other studies in its findings, as well as where it presents items not hitherto disclosed.

THE HEALTH DEPARTMENT AND THE ACCIDENT PROBLEM

Before presenting these details, let us turn our attention for the moment to the second question asked at the start—what is the health department's part in the home accident problem? Many health departments fortunately seem disposed to take an increasing interest in the entire accident problem, as is also true of public health nursing groups. As a whole, accidents constitute a very big factor in our national experience, with a major element of preventability. In the United States, in 1940, accident fatalities were distributed as regards major units as follows:

	Accident Fatalities
Home Accidents	33,000
Traffic Accidents *	34,500
Public (not traffic) accidents	15,900
Industrial Accidents *	17,000
Total (* eliminating duplication of 2,900 deaths)	97,500

Also, in 1940, among the 17 million industrial policy holders in the Metropolitan Life Insurance Company, the death rate for all accidents combined was 46.7 per 100,000, ranking sixth among the leading causes of death, and preceded only by heart disease, cancer,

cerebral hemorrhage, chronic nephritis, and coronary disease with angina pectoris. As a cause of death accidents run ahead of tuberculosis, pneumonia, and diabetes. In 1940 the death rates for all ages in the Metropolitan Industrial policy holder experience per 100,000 for different groups of accidents were:

	Rate per 100,000
1. Motor Vehicle Accidents	18.1
2. Occupational Accidents	6.2
3. Home Accidents	11.7
4. Other	11.9

As to automobile and street accidents, some health departments are continually increasing their coöperative activities with police departments and private agencies. In industry as well, we seem to be on the verge of a much greater degree of activity by health departments, in cooperation with labor and industrial units, on a state basis at least.

THE HEALTH DEPARTMENT AND HOME ACCIDENTS

It must be recognized here that only in small part are home accidents controllable by collective means, as were certain of the major health hazards in the community in earlier years, such as those diseases curbed by a pure water supply, sewage disposal, and milk pasteurization. It is true, as regards home accidents, that there are certain basic requirements in home *construction* which tend to eliminate some hazards. Enforcement here usually falls to some official agency other than the health department. There is also an increasing amount of legal requirement as regards home living *equipment*, at least as to electrical installations, though here, too, promotion and enforcement generally are inadequate and are found in the hands of other branches of government, such as building departments and fire departments. In the home accident field, more than in the highway and industrial fields, and more than was the case originally in the public health field in general, the major portion of the problem is a personal one, dealing with home living *methods*, and controllable only by proper education and motivation—at least in a democracy, where the privacy of the home is still respected. We suppose that in a totalitarian state, if the authorities can send a man to a prison camp for violating restrictions about listening to foreign broadcasts in his own home, they can probably also jail a man for falling off a rocking chair while hanging a picture. But in America today we must fortunately still depend upon education! It is also true that the health department is peculiarly fitted by tradition and experience in meeting this need. Better than other public officials, the health officer knows and practises educational technics in his promotion of personal hygiene. Health officers might be expected to demonstrate this superior ability should they increasingly share the job of controlling street accidents with police departments. In industry, they are beginning advantageously to share their skills with departments of labor. In the home, they will have as coöperating agencies those who can greatly benefit by health department participation and leadership, such as the fire department with its considerable interest in home hazards, and the voluntary safety groups, who have up to this time devoted most of their energies to street and highway problems. In preventing home accidents, the health department will certainly find not only an uncrowded field and a free range, with many wide gaps for energetic efforts, but they will also find a great opportunity for the application of the health department's peculiar personal hygiene technics—an orientation of interest and a concentration of effort that should mean much in

decreasing preventable incapacity and in promoting life conservation.

WHAT IS KNOWN ABOUT HOME ACCIDENTS

Without attempting a historical review, we shall refer to several important studies of home accidents by public health agencies in the last year or two and to a few of the more important observations in these studies.

Accidents in the Urban Home as Recorded in the National Health Survey—Rollo H. Britten, Sr. Statistician, United States Public Health Service—*Public Health Reports*, November 8, 1940.

1. Home accidents cause nearly as many deaths as diabetes, more than appendicitis, and many more than diphtheria, scarlet fever, whooping cough, and measles combined.

2. Housewives sustain one-third of all serious home accidents, and an additional one-fourth occur among children for whom housewives have the major responsibility.

3. A large proportion of home accidents occur among children and adults in the most productive ages, and many result in permanent orthopedic impairments and in blindness.

4. Accidents in urban homes, disabling for one week or more, occur at the annual frequency rate of 4.65 per 1,000 persons. Those disabling for a month or more occur at the rate of 2.52 per 1,000 persons.

5. The average duration of disability from home accidents disabling for one week or more is 49 days.

6. The annual frequency rate for females is 5.45 per 1,000, and for males 3.78 per 1,000 (in part reflecting exposure).

7. More accidents occur among persons in poor economic circumstances, the highest rate being for persons in the relief group.

8. In 64 per cent falls were the means of injury; cutting and piercing instruments in 13 per cent; burns in 8 per cent; and other means in 14 per cent.

Illness and Accidents Among Persons Living under Different Housing Conditions—Rollo H. Britten—*Public Health Reports*, March 28, 1941.

As regards accidents:

1. Frequency of home accidents increased as rental of dwelling went down, males showing a much greater rise in the home accident rate with drop in rental than was true for females.

2. Each means of injury showed higher rates in dwellings of low rental, though frequency of disability from burns rose more rapidly with falling rental than from any other means.

3. It is impossible to determine to what extent factors associated with low income play a part, such as dilapidation and faulty house design, overcrowding, poor equipment for household operations, etc.

Home Accident Fatalities—an Analysis of the Causes of Fatal Accidents in Minnesota Homes—Minnesota Department of Health.

1. During the first 6 months of 1940 accidents were responsible for the deaths of 849 Minnesota residents—40 per cent of these were home accidents.

2. The principal factors thought to be responsible were inherent carelessness, negligence of adults toward children, weather and the forces of nature, and incapacity through old age and disease.

3. About 54 per cent of the home accidents resulted from falls, but 92 per cent of those dying from falls were in the older age groups and not actively employed in any gainful occupation. Deaths due to falls are bound to increase as the population ages, paralleling the situation with reference to cancer, heart disease, and other degenerative affections.

4. Burns were responsible for nearly one-fourth of the total, and affected mainly children and young people. These accidents were very distinctly from controllable causes, such as scalding, lighting fires with kerosene, conflagrations, defective wiring, smoking in bed, etc.

Home Accidents and Their Prevention—Professor Irma G. Nevins, Kansas State Teachers College.

Tabulations from this survey, reported by Dr. F. P. Helm of Topeka, Kansas (Chairman of the Committee on Accidents of the State and Provincial Health Authorities of North America) among other things show:

1. In Kansas in 1940 there were 530 deaths among all ages from home accidents.

2. Falls accounted for approximately 60 per cent, and burns for 16 per cent—a total of 76 per cent for these two causes.

3. Sixty-six per cent of all these fatalities occurred among people 65 years of age and over.

4. Twelve per cent were among children 4 years of age or under, mainly from suffocation, burns and drowning.

Those interested will find it well

worth while to consult these reports. They contain many additional significant findings. From certain points of view we will not perhaps have picked out the most important observations. There are also other studies in recent years that may readily be consulted in appropriate library files.

THE STUDY BY NURSES: METHOD AND LIMITATION

Incomplete portions of this study have been reported earlier, in which some account was given as to the method used.[1, 2] It may briefly be indicated that early in 1940 the Metropolitan Life Insurance Company asked its salaried nurses throughout the United States and Canada to submit reports on all cases regarding accidental injury for which nursing service was requested. As the company maintains in the United States and Canada 325 salaried nursing services employing a staff of 674 nurses who handle about 300,000 nursing cases a year, the study by this staff covers a large number of individual homes.

In launching the inquiry, letters of instruction were sent to each nurse, and additional information was furnished them through regular supervision channels. No special forms were developed for the purpose; the nurses furnished the required information on their regular case reports. They were instructed to report on each case involving care necessitated by an accidental injury; to make inquiry regarding conditions under which the injury was received and to report first whether it was the result of a motor vehicle, occupational, public, school, or home accident. In the case of home accidents, additional information was requested, including the nature of the injury, part of the body injured, action of the injured person, location and type of accident, and the objects involved.

In general, the study was confined to accidental injuries sustained by Industrial and Intermediate policy holders, and Group certificate holders of the company. It covers cases which were of sufficient severity to require nursing service. Of the home accident cases reported 13.4 per cent were hospitalized, and 0.4 per cent were fatal.*

In summary, this survey included an average of 1,079.5 accident cases per month, or a grand total of 12,954 during the year. It is interesting to note that 49 per cent of all injuries reported, or a total of 6,315, resulted from home accidents. The National Safety Council figures show that home accidental deaths are about 36 per cent of all accidental deaths and that home injuries are about 50 per cent of the total.

THE STUDY BY NURSES: PRINCIPAL FINDINGS

The findings in this survey are assembled in several tabulations thus far completed. More combinations and analyses are possible and may be made subsequently:

I. *Sex and Age*—

As to sex, no special tally was made of cases recorded, it being assumed that they constituted a fair cross-section of the nursed group in general, and were similar to the figures for all nursed policy holders, which, in 1940, were 28 per cent male, and 72 per cent female. Females, and children 14 and under, represent a combined total of 90 per cent. This means, as is the case with our nursing service in general, that it is somewhat selective against the male population, when compared with the population at large, and when compared with figures cited from other more generalized home accident studies.

Based upon a 50 per cent sampling, the home accident cases were distributed by age as follows:

* Based on 10 months of the study which included 83 per cent of the total cases reported.

	Per cent
Under 4 years	21
5–14 years	16
15–24 "	6
25–44 "	20
45–64 "	23
65 and over	14
Total	100

It will be noted that this distribution is in marked contrast to other figures cited earlier. In the Kansas study, for instance, the accident cases 65 years of age and over constitute 66 per cent of the total, whereas in the Metropolitan experience this figure is only 14 per cent, which means that in the Metropolitan experience the chronic older cases are given only a limited service, and the aged are not insurable.

In the Kansas figures children under 4 years constitute 12 per cent of the total, whereas in the Metropolitan this figure was 21 per cent—reflecting an obviously different exposure. In the Metropolitan study, if we take children 14 years and under we have a total of 37 per cent—which influences many factors in the subsequent analysis.

II. *Type of Accident*—

The type of accident is indicated by the following items and percentages *:

	Per cent
Falls from Heights	13
Falls on Levels	33
Falling Material	2
Handling Materials or Objects	11
Stepping on Objects	6
Collisions with Objects	15
Hot or Burning Substances	13
Electric Burn or Shock	1
Inhaling Gas or Smoke	—
Poisons, Not Gas	1
Other	5
Not Specified	—

Items of special interest include:

1. Falls from Heights and Falls on Levels show a combined percentage of 46 for total falls, which as usual becomes the first cause. This is not as great as in some other studies where more older people were involved, as in the Minnesota study, for instance, where the figure for falls was 54 per cent.

2. In the Metropolitan study "Collisions" takes second place—presumably accidental contacts with home equipment.

3. Burns, with 13 per cent, takes third place, as compared with 16 per cent in the Minnesota study—possibly reflecting some differences in definition.

4. It is interesting to note that Poisons accounted for only 1 per cent of the home accidents, and Inhaling Gases and Asphyxiation was also a negligible cause of home accidents. Does this mean perhaps that these two items stand out as favorable results of educational programs, which have laid great stress upon the danger of carbon monoxide poisoning, and the importance of labeling poisons and keeping them away from children? It is to be hoped so, although it cannot be proved. It may be that carbon monoxide poisoning is so often promptly fatal or immediately hospitalized as to eliminate home nursing contacts.

III. *Objects Involved*—

	Per cent
Household Furnishings or Equipment	12
Floor Coverings	3
Slippery Surfaces	6
Toys and Play Equipment	4
Tools and Sharp Objects	14
Utensils	7
Food	3
Animals, Insects, etc.	3
Heating Equipment, etc.	5
Laundering Equipment and Materials	5
Inflammable Liquids or Materials	2
Other Household Appliances	1
Plumbing Fixtures	—
Structural Defects	2
Firearms	1
Automobiles	1
Multiple	—
Other	14
None or Not Specified	17

1. It will be noted that Tools and Sharp Objects stand first with 14 per cent (13 per cent in the National Health Survey). From the records, as well as on a basis of general assumption, this would seem to reflect carelessness, lack of training and skill, the unsupervised use of adult instruments by children—

* A dash (—) represents less than 0.5 per cent in this and succeeding tables.

all representing a high degree of controllability.

2. In this breakdown, which is not entirely satisfactory, Household Furnishings and Equipment, with 12 per cent, takes second place. Some of this no doubt reflects poor construction, not easily remedied; some reflects more controllable equipment and still more controllable methods of living—subject to an educational influence.

As a matter of fact, we obtain a much more substantial factor here if we combine the figures for Household Furnishings and Equipment, Floor Coverings, Utensils, Heating Equipment, Laundering Equipment, Structural Defects and Other Household Appliances—a total of 35 per cent.

3. Two items highly controllable by education are Toys, with 4 per cent, and Inflammable Liquids with 2 per cent.

4. It is interesting to note, as was the case with Poisons and Asphyxiating Gases, that Firearms, with 1 per cent, is an insignificant factor.

IV. *Location of Accident*—

	Per cent
Living and Sleeping Quarters	15
Dining and Kitchen Quarters	30
Bathroom	2
Hallways, etc.	2
Cellar	3
Attic	—
Stairs or Steps	17
Porch, Yard, etc.	27
Garage	1
Other	2
Not Specified	1

1. The Dining and Kitchen Quarters comes first with 30 per cent, reflecting the leading item in table III (Tools and Sharp Objects) and the leading item in table VI, as will be seen below.

2. We find that the Porch or Yard comes second with 27 per cent, which reflects a high percentage of children, the item of "Playing" in table V, and the element of falls, as already discussed.

3. It is not surprising to find Stairs with 17 per cent. In fact, one might expect it to be higher.

4. These figures, as have others, indicate that the bathtub is a much maligned item of equipment in the household, the bathroom as a whole registering only 2 per cent.

V. *The Action of the Injured*—

	Per cent
Walking and Running	37
Household Cleaning	3
Laundering Duties	4
Other Household Duties	8
Cooking	5
Eating	1
Playing	24
Tending Heating Equipment	1
Other	13
None or Not Specified	4

1. First place is taken by Walking and Running with 37 per cent, and Playing is second, with 24 per cent—reflecting again a large percentage of children, and the prominence of the Porch and Yard in the preceding table.

VI. *Nature of Injury*—

	Per cent
Cuts, Lacerations, and Abrasions	26
Bruises and Contusions	12
Burns and Scalds	21
Strains and Sprains	11
Asphyxiations	—
Fractures and Dislocations	20
Poisoning	1
Foreign Bodies	1
Bites	2
Multiple	3
Other	3
Not Specified	—

1. We have already referred to Cuts, Lacerations and Abrasions which takes first place, with 26 per cent. This reflects the use of instruments by housewives in the kitchen, and also reflects the high percentage of women in this study.

2. Burns, with 21 per cent, takes second place, as is the case in most studies.

3. The importance of falls is implied in this table by such items as Bruises and Contusions (12 per cent), Strains and Sprains (11 per cent), and Fractures and Dislocations (20 per cent)—the latter in particular indicating the serious and incapacitating consequences of many home injuries.

VII. *Part of Body Involved*—

	Per cent
Hands and Fingers	16
Head, Face, and Neck	11
Legs, Feet, and Toes	32
Arms	12
Eyes	1

(cont.)	Per cent
Trunk	16
Internal	2
Multiple	10
Not Specified	—

1. It seems likely that the high percentage (32 per cent) for Legs, Feet, and Toes has something to do with the high percentage of children, though a breakdown that would demonstrate this has not yet been carried out.

As Mr. Cole and Miss Haupt said in their paper, referred to earlier, it is possible roughly to summarize these data by presenting a composite picture or "montage" of a home accident, which would give us a description somewhat as follows:

"The victim received cuts (lacerations or abrasions) of his legs (feet or toes) as a result of a fall on a level surface against a tool (or sharp object) while he was walking (or running) in the dining or kitchen quarters (or yard)."

This of course could legitimately be modified in many ways, and for the population as a whole is no doubt a bit out of focus because of the high percentage of children and women in this inquiry.

As pointed out in discussing the older studies and in analyzing this one in particular, these data indicate that there are in the picture many factors subject to control by educational methods, whether these be through home visiting contacts, through literature and other educational devices, through schools, special classes, and other means.

The elements to be attacked include *ignorance* of the home hazards, such as those involved in heating equipment, laundry equipment, wiring, and the use of inflammable fluids. They include *carelessness*, such as the disposition of toys, the presence of slippery surfaces, negligence in the supervision and instruction of children. They include *insensitivity* to the serious possibilities of home accidents, the great amount of disability involved, through fractures, dislocations, strains, cuts that may become infected, etc. All in all, a very substantial portion of the problem appears to be subject to educational approach and potential control.

CONCLUSIONS

1. In home accidents there is an extensive waste of human values, largely preventable by construction regulations, by legally enforceable standards as to home equipment, and by home accident education as to equipment and living methods, especially the latter.

2. Public health and visiting nurses, in addition to the aid which they furnish in giving care to the injured, have demonstrated in this inquiry that they may perform a very useful service in adding to our knowledge, by accumulating data for analysis. The more general adoption of specific procedures, with appropriate record forms, and home hazard check lists will promote this end. Further, their interest in the problem is easy to arouse and should be augmented through staff education programs, undergraduate and postgraduate curriculum enrichment, and other means. There is much that they can and will do through their home contacts to teach the principles of accident prevention, if they are sensitized to home needs in this regard. To some extent also this would no doubt apply to other periodic home visitors, such as inspectors for various purposes, home demonstration agents, visiting teachers, insurance agents, and others. Nurses, agents, and others with advantageous home contacts can with advantage be implemented with appropriate home accident prevention literature from official or private sources, and with other educational devices.

3. For the local health department, the home accident field offers a remarkable opportunity. Its work here as it develops will no doubt be carried

out in close coöperation with other agencies, such as fire departments, safety councils, schools, and insurance companies. The department will presumably want to develop its own literature in this regard, and can also make advantageous use of instructive material from other sources. The department can encourage its own nurses to look for home hazards, to be aware of the results of such hazards, and to be on the alert for the elimination of unnecessary dangers.

On the highway and in industry, the volume of accidents varies from time to time, influenced by the volume of traffic, the amount of employment, the pressure upon industrial and commercial activity, etc.—a volume that is now expanding, with our increasingly intense national activities. But the home accident problem is comparatively stable and its trend predictable. The human exposure to home hazards is more or less constant, and throughout the country people are going to continue in about the same proportions to live in homes, whether they be apartments, flats, farm homes, or family dwellings.

Accidents in the home which lead to incapacity or to fatalities among useful or promising members of society—adult or child, male or female—are in the same category of wastefulness in our national economy, as are similar losses in essential industries or in the nation's armed forces. Even accidents which lay up for long periods of time aged members of family groups—so common in the home—place a handicap on the efficiency and happiness of the family unit. According to the National Safety Council, 61 per cent of deaths and injuries to industrially employed persons occur while not at work, and in large proportion while at home. Certainly, under present conditions, we have in the home, from the angle of conservation of human resources, a place where the health department, with its allies, and on a basis of its other home services, can perform, through its educational technics, a basic service in accident prevention, advantageously affecting individual, family, community, and national welfare in this pressing time.

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Adolescence and Public Health

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WITHIN the past few years the adolescent has come into the focus of medicine and public health. As it was twenty years ago when the preschool child began to claim attention, it is now discovered that adolescence is a much neglected period of life. A brief review of what is known about this period and of some implications for public health may be of interest.

DEMOGRAPHIC AND MORTALITY DATA

First, as to the demographic and mortality picture during the second decade. The continued decline in the birth rate, which was reflected in the 1940 census by a further reduction in the number of children under 5, has not yet influenced the number of adolescents, but it is clear that within the next decade there will be a reduction in the number of children between 10 and 19 years of age. This diminution in the child population has been reflected in a decline in elementary school enrollments which, in the larger cities, has been marked. The secondary school enrollments may not register this change immediately if a larger proportion of children, as seems probable, continues through the high schools. It should be noted that the rural regions, especially in the South, continue to have a higher birth rate than elsewhere and therefore do not show these declines in child population. It is these regions which are less adequately provided with educational, health, and welfare agencies for child care.

The lowest death rate for all ages occurs in the age group 10 to 14, followed by a rise in the age group 15 to 19. It should be noted that until recently the female death rate, in the period 15 to 19, has been higher than the male, although lower in all other age periods. The pronounced reduction in the death rate that has been achieved in infancy has not been attained in the second decade, indicating that these already low rates are less susceptible to improvement or that this period has benefited less from advances in medicine and public health. During the second decade boys and girls are seen less frequently by the private physician, even among the well-to-do families who discontinue the periodical health examination as their children reach 9 or 10, or earlier. Moreover, even the limited health services of the elementary school have not been provided in the high schools to any large extent. Thus the adolescent may, and often does, receive little or no health supervision or medical attention unless acutely ill.

GROWTH, DEVELOPMENT AND MATURATION OF THE ADOLESCENT

During the past ten or fifteen years intensive studies of growth, development, and maturation of boys and girls during the second decade have been in progress, from which will soon come reports that will help to illuminate this period of life. Some of these studies have been longitudinal, that is, continued observation and measurement

of the same children from 9 or 10 years of age to 18, thus providing a better understanding of the processes of growth and development as they appear in individual children.[1] While only a few preliminary reports have been published, some of the major findings of these studies are now becoming available.

It is being found that there is an orderly sequence of growth, development, and maturation through which children, unless specifically defective or handicapped, will pass between childhood and adult maturity. But it is evident from study of individual children throughout this period that each individual child, in accordance with his inherited constitutional pattern and the adequacy or inadequacy of his nurture, will pass through this sequence at his or her own rate. Thus each individual child undergoes this orderly process of growth and development at different ages and with different rates of progress; moreover, he signalizes his attainment of different stages in this process by structural and functional dimensions that are uniquely his own. This idiomatic development of the individual merits emphasis because the cross-sectional study of children, using a different group of children for each age period to establish age norms, has ignored these individual differences and sometimes has created confusion and misunderstanding.[2]

An analogy may be appropriate to illustrate the idiomatic process of development. If a group of boys and girls start from New York to go to Chicago, some of them may travel by airplane, others by fastest railroad train, still others on the bus, or by private car, while a few will attempt to hitch-hike their way, and a small number may trudge along on foot. The children traveling by each of these different modes of transportation will arrive in Chicago at different times and in different states or conditions, since each mode of travel exposes the individual to different risks or costs and brings the traveler certain advantages from traveling in that manner and at that speed. Moreover, it is probable that each mode of travel and rate of development involves more or less specific requirements of nurture to maintain the organism while undergoing such changes.

Since the term *adolescence* is used with various meanings, it may be desirable to recall that man has not only a prolonged infancy but apparently has the longest period of adolescence. It would clarify the discussion of the second decade to recognize three periods or stages, namely, the pre-pubertal, puberty, and adolescence, and to limit the term adolescence to the post-pubertal period of the second decade. We should, of course, realize that growth and development of the child is a continuous process from conception on, but may be viewed in terms of the more or less well defined stages or periods for purposes of study and discussion.

PRE-PUBERTAL PERIOD

The pre-pubertal period begins approximately around 9 years of age when the child has usually reached a stage of relative stability. Then begins, or more accurately we should say then occurs, an acceleration of growth and developmental processes, notably in the skeleton and in the elaboration of sex hormones. Recent studies have shown that both male and female sex hormones are recoverable in the urine of the child as early as 5 years of age, but they increase in volume during the pre-pubertal stage at which time there is ordinarily a growing predominance of male or female sex hormones, culminating in the male or female puberty.

Thus it is being shown that the rate of pre-pubertal development may be very rapid in some children and bring them to puberty at an early age, while in others the process may be prolonged

until fairly late in the teens. Girls may reach puberty, as signalized by the menarche, from the age of 10½ years to 17 or 18, and an almost equal range is shown by boys, although boys tend to mature later than girls. It may be pointed out that a confusion about puberty has grown up, due in part to the ambiguity of language. It has been asserted that the tall girl, for example, will reach the menarche earlier than the short girl, which is true in so far as the girls who are tall during the pre-pubertal period may attain the menarche at a relatively early age. However, it has been shown that such girls will ordinarily not reach a terminal height equal to those girls whose menarche may be delayed until 16, 17, or 18, since this latter group of girls usually continues to grow and thus reach a terminal height in excess of all other girls.[3] Somewhat similar observations have been made on boys, since the short, muscular boy may attain puberty in advance of the boy who reaches a greater height but who reaches puberty later. In general, therefore, it appears that puberty occurs later in the boys and girls who continue to grow and attain a higher stature, since sexual maturation seems to check or stop growth in stature.[4] After puberty there may be an increase in sitting height with little increase in length of legs. In the pre-pubertal years, girls usually grow more rapidly than boys and exhibit greater stature but are overtaken by boys after puberty. It seems clear that there are pronounced individual and constitutional differences in the pattern and rate of development during the second decade that have large significance for programs of education and health care of adolescents.

An examination of the individual boy or girl moving through the second decade, especially those who are accelerated, will often reveal a condition of biological asymmetry or incongruity, as shown by the different rates of development of organ systems. For example, some boys will attain almost their full adult stature within a brief period of 18 months, but may continue to exhibit relatively juvenile characteristics in the genitals and in the cardiovascular, respiratory, and other organ systems, which have not caught up, so to speak, with their adult stature.

Again it has been made clear by recent investigations that the menarche marks only a stage in sexual maturation[5] since it may require as much as 1, 2, or more years before a girl achieves some degree of menstrual regularity.[6] Moreover, it appears that the beginning of ovulation may be deferred for several years following the menarche, thus indicating that further maturation and development of the gonads and the genital organs are necessary before full sexual maturity is attained.[7]

It may also be pointed out that the processes of growth and development and maturation, especially when accelerated or retarded as frequently observed among adolescents, may be accompanied by a greater or less degree of physiological instability and incoordination. Not only uneven growth and development may involve physiological instability, but the less dramatic changes in dimensions accompanying so-called normal growth also interfere with stable functional activity as shown by the variability of response and performance. Also, it may be noted that with the change in body size, especially among that group of boys who grow very rapidly around 14 or 15 years of age, there may be a pronounced muscular imbalance and incoördination. Such individuals are almost suddenly confronted with the necessity of developing new eye-hand coördinations and use of the body because their rapidly changing size has disorganized their former motor habits and performances.

THE QUESTION OF NORMAL STANDARDS

The emphasis placed upon variations in the pattern and rate of development and upon the wide differences in the structural and functional dimensions attained by individual boys and girls may be justified in view of the tendency to set up fixed norms for chronological age groups to which individual boys and girls are expected to conform. These norms are modal or average values or central tendencies to which only a portion of the subjects conform. In so far as this tyranny of the norm may operate against a better understanding of adolescent needs and possibilities and not infrequently work to the disadvantage of the individual, it should be more clearly recognized. The development and refinement of methods, such as hormone assays, x-rays of skeletal development and maturation, assays of nutritional levels and requirements, especially of vitamins and minerals, and measurements of other physiological functions, offer promising instruments and procedures for those who wish to assess the development and maturation of individual boys and girls. It is no longer necessary to rely only upon measurements of height and weight or to limit attention to temporary status. As recently pointed out by Krogman,[8] "We must differentiate between trend and phase, must recognize that comparable points may be far apart on the scale of time, and *must envisage progress rather than status.*"

NUTRITIONAL STATUS

Recently more attention has been given to the physiological functioning of adolescents, especially the nutritional status of the boys and girls exhibiting different patterns of growth and development. As indicated earlier, each of these different ways of traveling from childhood to adult maturity carries with it certain organic liabilities and requirements which may be very pronounced, as in the case of the boys who are growing very rapidly and presumably have an increased need for calcium, phosphorus, and vitamin D. How far a systematic effort to provide more adequate care and nutrition during the second decade of life might yield large results in better health and increased capacity for meeting the demands of maturity, is a question for which no definite answers are now available. A current study in two New York City secondary schools, of low and high economic status, employing the latest methods for assessing nutritional status and deficiencies will provide much needed data on this question and indicate what might be desirable as a program of experimental nutrition of adolescents.[9] Another current study in Pennsylvania will also provide data on a group of boys and girls who have been under scrutiny for several years.[10] The provision of a regimen for adolescents conceived in terms of the requirements of growth and development and maturation as idiomatically expressed by individual boys and girls, offers an unexplored but promising opportunity in which public health officials could collaborate with educational agencies, recreational organizations, and the family. Moreover, in the light of the recent studies on adolescence and the investigations coming from medical and biological research, it seems probable that some of the functional disabilities and incapacities found in the adult population might be reduced, if not avoided, by greater attention during the second decade to the needs and functional disabilities of individual boys and girls.[11]

It seems probable that some of the psychosomatic disorders of adults begin or are fixated in different organ systems during adolescence. This question is being explored but no definite findings can be cited today. The physiological instability during adolescence yields to the more or less "steady state" of ma-

turity in which persistent imbalances and incapacities may be fixated, as indicated by the individual variations in adult homeostasis.

It may be suggested that preoccupation with the diagnosis and correction of defects has obscured the more fundamental task of improving the vitality and the functional capacity of boys and girls with these large individual differences in patterns of growth. The defects that are corrected may be symptoms of deficiencies or inadequacies of nurture and ways of living which continue unremedied by the corrective treatment of defects. This points to the possibility that medicine and public health may contribute more to education than the customary diagnosis and correction of defects by bringing a knowledge of growth and development and the requirements for adequate functioning to bear upon the whole educational process, including the buildings and equipment, daily programs, teaching schedules, and the like. It is probable that a searching evaluation of what our schools are doing to and for children during the second decade would reveal many practices that are either handicapping such children or imposing additional stresses and strains, if not creating difficulties that will seriously impair the individual's future.

The discussion thus far has stressed what is beginning to appear from the study of physical growth and development, but it is of equal importance to recognize the process of personality development as it takes place during the second decade, because of the large significance of this time for the individual's future conduct and his mental health. The adolescent's emotional reactions are also of importance to any program of health care during the second decade.

EMOTIONAL REACTIONS OF THE ADOLESCENT

It is being pointed out with increasing emphasis that the adolescent boy or girl is often subject to considerable anxiety about his or her normality, especially when confronted with the usual requirements made upon children according to chronological age. Boys who lag in stature behind girls of equal age are often self-conscious and belligerently hostile to girls in their school classes. Both boys and girls are concerned about the size and shape of their bodies, particularly about the adequacy of their genitals. In so far as they suffer from these anxieties they may be sensitive and retiring. While parents and teachers complain about the troublesome adolescents, it must be remembered that the adolescent himself may be in a condition of acute confusion and worry about his changing body, his lack of organic coördination and stability, and his inability to measure up to the many new and exacting demands that are almost suddenly thrust upon him at this period, while he is already suffering from emotional disturbances.

As indicated earlier, the processes of growth, development, and maturation are continuous from birth onward. What the child has experienced in infancy and childhood is a part of him, both organically and psychologically, and continues to operate throughout adolescence and adult life. Intensive study of adolescents is showing how many of the conflicts and emotional disturbances of early childhood are revived at puberty.[12] The boy or girl who has had an unhappy childhood, marked by overt conflicts with parents and rivalry with siblings or by fears and anxieties, may, at puberty or shortly after, revive these difficulties which have been more or less quiescent for several years. Likewise early worries about sex differences and other sources of anxiety over sex are liable to renewal at puberty. These older persistent difficulties therefore come to the surface during adolescence and are exhibited in often stormy family scenes and disturbances in school.

While in many other societies, what a child is taught serves to guide and prepare him for later living, in our culture we confront the adolescent with many sudden discontinuities, expecting him to forget and relinquish what we have taught him earlier and to accept new and often contradictory lessons as preparatory to adult life.

During childhood it is customary for parents to demand unquestioning obedience and conformity to their requirements. Children are expected to accept what their parents believe and say, and to submit to whatever the parents decide for them. Then almost suddenly, during adolescence, boys and girls are expected to assume responsibility for their conduct and to exhibit an increasing amount of independence and good judgment. The transition from the submissive, unquestioning obedience of childhood to these new responsibilities for conduct presents a difficult and often bewildering problem to many adolescents. These difficulties are enhanced and loaded with emotional conflict when the parents oppose these efforts of their sons and daughters to grow up and resist their every attempt to become independent and self-governing. The adolescent's struggle to escape family ties or domination are usually accompanied by an acute need for their reassurance and support which is rarely declared but is evidenced in many indirect forms of dependence.

THE PROBLEM OF SEX EDUCATION

It is also our custom to deny young children an understanding of sex differences, of mating and sex functioning. They may ask questions and earnestly seek to understand but we prefer to confuse their young minds and obscure the whole area of sex knowledge. Thus when in adolescence they are confronted with puberty and the development of genital functions and all the accompanying alterations of sexual maturation, they are again faced with a sudden and often dramatic reversal of their childhood teachings, notably in the various forms of warnings and threats offered as sex education. So much of what is told adolescents about sex is in the form of dire prophesies of disaster and of almost terrorizing dangers of venereal infections. If the adolescent, therefore, is further confused by this process it is not difficult to understand in the light of his earlier teachings or misinformation. Moreover, the concern shown by teachers and guidance workers for the development of normal interests in the other sex, as a necessary step toward adult mating, contrasts strongly with their childhood experiences and with this anxiety-producing form of sex education.

It is also worthy of note that in accordance with our traditions, children are given a more or less unreal picture of life and people, of how society operates, and why things happen as they do. Children grow up, therefore, cherishing many illusions and usually are wholly unprepared for the demand that they put aside their fantasies and illusions and face the actuality of life around them with all the major readjustments this may entail. If they do accept the requirement to face reality and become more or less "hard-boiled" and cynical, they are apt to be scolded for lack of ideals; while if they develop altruistic aspirations and join lost causes they are accused of lacking sense and proportion or threatened with loss of their mental health.

These and other transitions should be recognized in the situation facing adolescents for which they can find little help or guidance. Moreover, it is important for physicians and public health officials to recognize this situation because it gives some clues to the resistance often exhibited by adolescents to their proffered services. The adolescent may, because of anxiety over his normalcy and

his genitals, be unable to ask for help or information however desperately he craves it. He or she may even be unable to answer direct questions on these topics because they are so disturbing. Such refusals or silence may therefore be misinterpreted or misunderstood unless it is realized that the adolescent is liable to such stresses and resistances. Likewise, adolescents may resent well meant and much needed advice offered by health and guidance workers because they are fighting against parental solicitude or domination and fear all other adults in authority. Even the appeals made to their enthusiasms and loyalties may be resented because adolescents suspect they are being again misled and fooled by adults as they were in childhood. Thus the health programs for adolescents may meet with a number of unexpected difficulties and obstacles that are explicable in the light of the adolescent's past history and current preoccupations, as recent studies are showing.[13-17] The school physician and the public health official must therefore often abandon the direct or didactic approach to the adolescent and seek, through other avenues, to effect needed changes in living, eating, and personal hygiene. The desire of the adolescent to be like his contemporaries and to do as they do offers possibilities for group programs which may bring desired changes in diet and so on, not easily obtained by persuasion of individuals.

THE PROBLEM OF DELINQUENCY

Within recent years the study of delinquency has shifted the older legal view toward a recognition of delinquency as a symptom of frustration, defeat, and personality difficulties which often arise from the confused and conflicting neighborhood and family life of adolescents and pre-adolescents. This change in viewpoint and in treatment of delinquents indicates a coming realization that delinquency may be considered as a public health problem. Means must be devised to deal with the adverse neighborhood and family conditions fostering delinquency just as we have learned to deal with contaminated water and milk supplies and the spread of infections or parasites. Likewise, ways must be found to offset, if not to eliminate, the situations and conflicts which threaten the mental health of adolescents which also is emerging as a public health problem of greatest urgency. It is to be noted that clinical diagnosis and therapy for individual delinquents or those with mental health hazards have had only a limited efficacy, thus indicating that a community-wide or neighborhood program of conservation of adolescents may be necessary for any larger achievements.

OTHER IMPLICATIONS

Heretofore it has been customary to think of health and sanity as something that was lost by some mysterious process, or was taken away as punishment for the individual's wickedness and unworthiness. There is a growing realization coming from various investigations and intensive studies that health and sanity have to be achieved by meeting the demands and the tasks of life with vitality and courage. This appears very clearly in the life of adolescents and therefore makes the second decade an important period for preventive medicine and mental hygiene, provided we can devise programs adequate to the needs and requirements of adolescents.

It begins to appear that in the larger task of health care, the care and guidance of our adolescent population will increasingly demand the utmost of our knowledge and courageous planning for the future.

We may regard the child and adolescent as sensitive indicators of the social and family conditions out of which they emerge, and recognize that these conditions are susceptible to modification and

improvement, in the light of the new knowledge of growth and development and the basic requirements for health and sanity.

This is not intended to imply that the public health officers are to be saddled with the full responsibility of managing all our social life, but it does suggest that in so far as they become concerned with problems of adolescent health, hygiene, and welfare, they may be justified in pointing to these community and neighborhood situations as contributing to, if not creating the human wastage that appears increasingly preventable. Vigorous leadership in this direction is needed to formulate a constructive program for the conservation of adolescents, which, to be effective, must elicit acceptance and support both from the general public and from the numerous professions and agencies and organizations that are dealing with adolescents today. An orchestration of these on the theme of more adequate nurture, care, and protection of adolescents is very much to be desired and might be furthered if a broad, comprehensive program to this end were presented by public health officers. In any such endeavor the growing knowledge of growth and development and maturation of children and adolescents now coming from the various research centers throughout the country, including the clinical studies of personality and emotional development, should give medicine and public health increasing confidence to undertake this task.

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NOTE: Current studies of child growth and development are being published by the Society for Research in Child Development, National Research Council, Washington, D. C., through its monographs on child development.

Population Variables and the Public Health Worker

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THE force of mortality pressing upon a people may in some degree be weighed and measured by accurate enumeration of the number and ages of the living, and the location, circumstance and causes of death and intelligent abstract of these facts." [1] Were Shattuck alive today he might add that an enumeration of the conditions under which people *live* is also an accurate measure of the force of mortality *and morbidity* pressing upon a people, for there is an increasing awareness that every circumstance which affects the individual throughout his life is the concern of the public health worker. Modern medicine recognizes that none of the factors which contribute to the malfunction of an individual can be disregarded, and that his personal and social relationships are significant factors in the determination of his fitness as a citizen. Such variables as the size of the family, composition of household, intra-family relationships, and the socio-economic characteristics of the environment are therefore the concern of all in the public health field.

That we are aware of this concept but fail to employ it to the fullest extent is demonstrated by the lack of use of census tract material. The Bureau of the Census set up for the 1930 census certain uniform and permanent areas for statistical reporting in 18 cities. The responsibility for publishing the data rested with local committees. At the end of the decade only 10 of these had made available all the data offered, the others using only a small part or none at all.[2] Some of this apathy may have been due to a lack of funds, but for 1940 this is obviated by the inclusion of more detailed data in the regular publications of the Bureau of the Census. Thus, in reporting this sixteenth census, the Bureau will publish data for more than 60 cities, by census tract, for race, nativity, sex, and age; education, unemployment status, occupation group, school attendance, country of birth, and citizenship (all by sex); and certain housing characteristics. The sole responsibility of health workers, therefore, is utilization of the data.

Two main values are inherent in the use of these variables: (1) in evaluating present practices in public health, and (2) in the charting of future services.

The purpose of this brief paper is to discuss some of these variables and to point out their value for public health technics.

The readily recognized and most used variable is, of course, the classic in demography: age and sex. Wide variations in the age-sex composition of the population of a city or other political unit are recognized, but are insufficiently taken into account. Chart 1 shows

* Under grant from the Josiah Macy Jr. Foundation.

POPULATION VARIABLES FOR THREE CENSUS TRACTS IN NEW YORK CITY

CENSUS TRACT 94 | CENSUS TRACT 124 | CENSUS TRACT 29

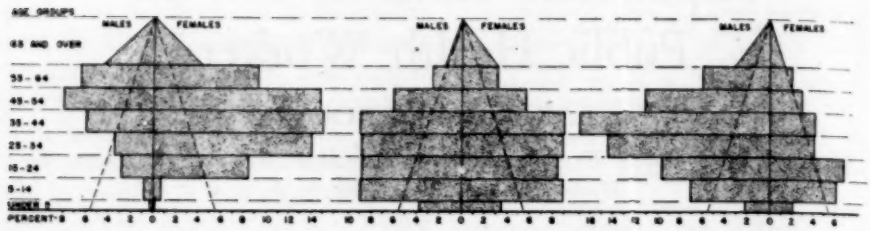

CHART 1—Variations in Age-Sex Distribution

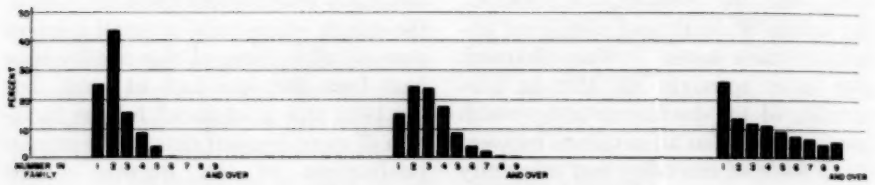

CHART 2—Variations in Per cent Distribution of Families by Size

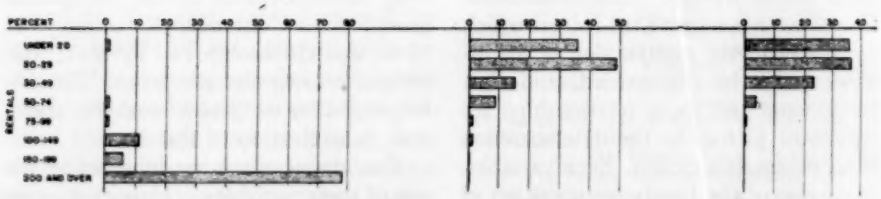

CHART 3—Variations in Per cent Distribution of Rents (A Socio-economic Index)

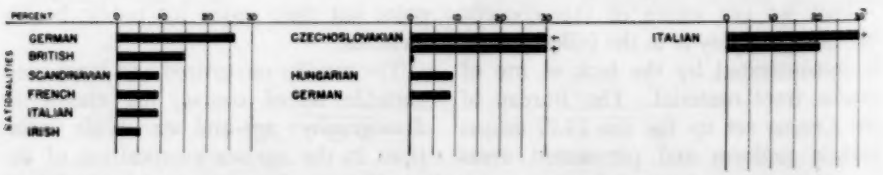

CHART 4—Variations in Per cent Distribution of Major Nationality Groups. By nationality of head of family. Only nationality groups having 5 per cent or more of total population are shown.

three extremes in census tracts in New York City. Tract 94, in a section of the city that is characterized by expensive hotels and apartment buildings, shows an unusually high frequency of females 25 to 54 years old, with an accompanying dearth of children under 15 years. Tract 29, in the "flophouse" section of the Bowery, shows an equal skewness in the distribution of *males* 25 to 54 years old. Tract 124, in a tenement section, has a more usual distribution of all ages. Obviously the health needs of these three areas are not comparable. Tract 94, with its expensive hotels and apartments, on casual analysis needs little public health activity; but analysis of its population figures (Chart 1), of family composition (Chart 2), and of the socio-economic status as indicated by rentals (Chart 3), shows a disproportionate number of unmarried women in this tract, presumably servants. Certain types of health service and health education are therefore necessary in this tract to meet the needs of this group. On the other hand, a child health station in this tract would soon close its doors for lack of patients, a fact clearly shown by the population figures.

Tract 29, on the other hand, shows an entirely different picture of family composition. Upon correlative analysis we find large numbers of men, large numbers of single persons, and at the same time relatively large numbers of families with many members. This is indicative of two vastly different types of population within the small area of the census tract. In the former, the specialized services peculiar to large numbers of unmarried men, such as venereal disease clinics and chronic disease services, are mostly indicated; in the latter, extensive clinic services designed for family groups are indicated.

In the case of tract 124, with its more usual distribution of age groups and sex, need is indicated for the clinics and services designed for family use, such as well baby clinics, prenatal clinics, etc.

Spot maps, while of value in themselves, have their usefulness greatly increased when used in conjunction with such age group statistics as are here illustrated. As a device for showing the spread of case loads, the map is unexcelled, but without this correlative use of age statistics, there is no means of determining the relative effectiveness of a service in reaching the potential case load. As an example, the author recently discussed with clinic workers the case load of a well baby clinic. The workers pointed with pride to their enrollment of more than 100 babies from one census tract, and failed to realize (from their spot maps) that there were more than 300 eligible children in that tract, about two-thirds of whom received no medical attention other than in case of acute illness. The correlative study of the map *with* the age-sex statistics would make for a better coverage of the tract in a case such as this.

The *size of family* variable is of use in determining the areas needing such services as we have mentioned. Chart 2 shows the characteristic scarcity of children in an area of high economic status. The question of economic status is determined in this case from an examination of the rental distributions in Chart 3. The variation in rentals among the three tracts is apparent from the chart.

Foreign-born population by country of birth data are especially valuable in recognizing the cultural factors inherent in the people of certain lands which make modern health programs difficult to establish. Chart 4 illustrates this variation. The foreign born of census tract 124, predominantly Czechoslovakian, are health conscious to a remarkable degree, although with certain biases; while the health pattern of the Italians, predominant in census tract 29, is often at variance with that established in the American culture. The

educational approach to the two groups can in no way be the same, and this fact must be recognized in setting up a health program.

Socio-economic variables, such as rentals, are of value in determining those areas most likely to need health service, especially in times of epidemic, and these should always be considered in relation to the housing variables.

Housing variables are of value in locating the areas where disease can be expected to be most prevalent. This subject is well covered in studies of the Environmental Sanitation Section of the National Institute of Health, and need not be repeated here.[3]

SUMMARY

The reporting of population data by census tracts for 61 cities in the 1940 census makes possible a more detailed analysis of demographic data than ever before. By utilizing the population and socio-economic variables, the health worker is able to analyze local material more effectively, and to plan future services more adequately. This is a long step forward in promoting effective public health administration.

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Plague Situation in the Western United States*

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BUBONIC plague gained entrance into San Francisco in 1899 or 1900 and, although eradicated in that city more than 30 years ago, the infection is still widespread in wild rodents of California and the Pacific Slope area. The epidemiological and historical aspect of this development has been the subject of many papers presented before this and other organizations that are interested in public health. The purpose of this paper, therefore, is not to discuss the academic aspects of bubonic plague, but to analyze the various factors that have contributed to the creation of foci of the infection in this area and to suggest measures that can control and eradicate the infection now residual in the wild rodents of the Rocky Mountain States and the Pacific Slope.

During the past forty years, bubonic plague has steadily progressed from a small area in San Francisco to the length and breadth of ten western states without any serious effort being made in recent years to stop its eastward extension. If the infection eventually reaches the Mississippi Valley, and this may very well develop, the record will be a lasting memorial to the apathy of public health administration in the western area of the United States.

With the exception of California, efforts to control the infection have been sporadic and feeble. In various sections, there has been either indifference, lack of appreciation of the potentialities, or a feeling of helplessness. Eradication is regarded as insuperable, but a review of the record will hardly support such a contention.

Plague was first known to exist in San Francisco in 1900. Since infection had already reached Hawaii the year before, it seems probable that the same vessel was the infecting vehicle of both Honolulu and San Francisco. Parallel developments have occurred elsewhere, notably in 1912 when a vessel from the Canary Islands carried infected rats to Puerto Rico and Cuba and possibly New Orleans on the same voyage.

Early in March, 1900, the city physician of San Francisco whose duty it was to examine dead Chinese who had not been attended by a regular physician, notified Dr. W. H. Kellogg, then bacteriologist of the San Francisco Health Department, of a case in which the cause of death was obscure. Dr. Kellogg observed a large femoral bubo in the dead man, and from a bacteriological examination of the tissues diagnosed the case as bubonic plague. Dr. Joseph Kinyoun, of the Marine Hospital Service, then on duty as quarantine officer of Angel Island, confirmed the diagnosis by animal inoculation and

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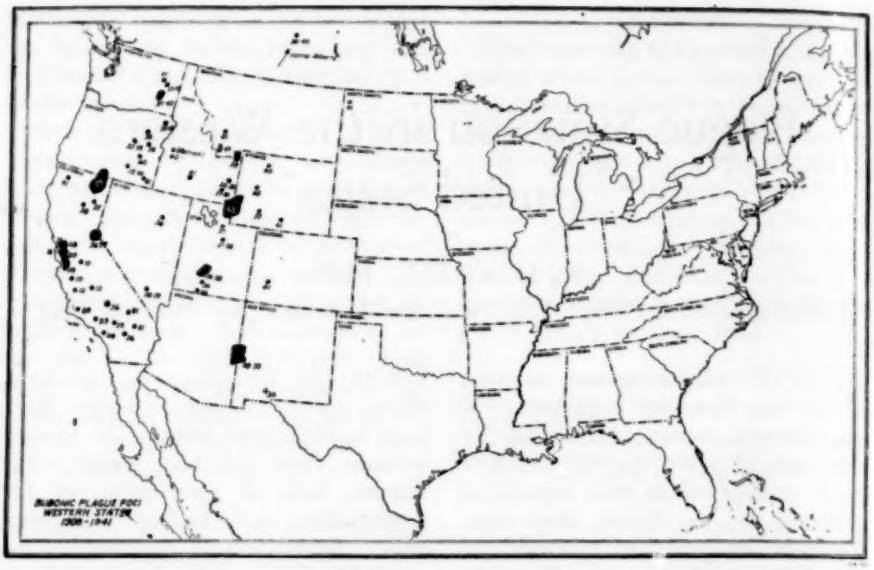


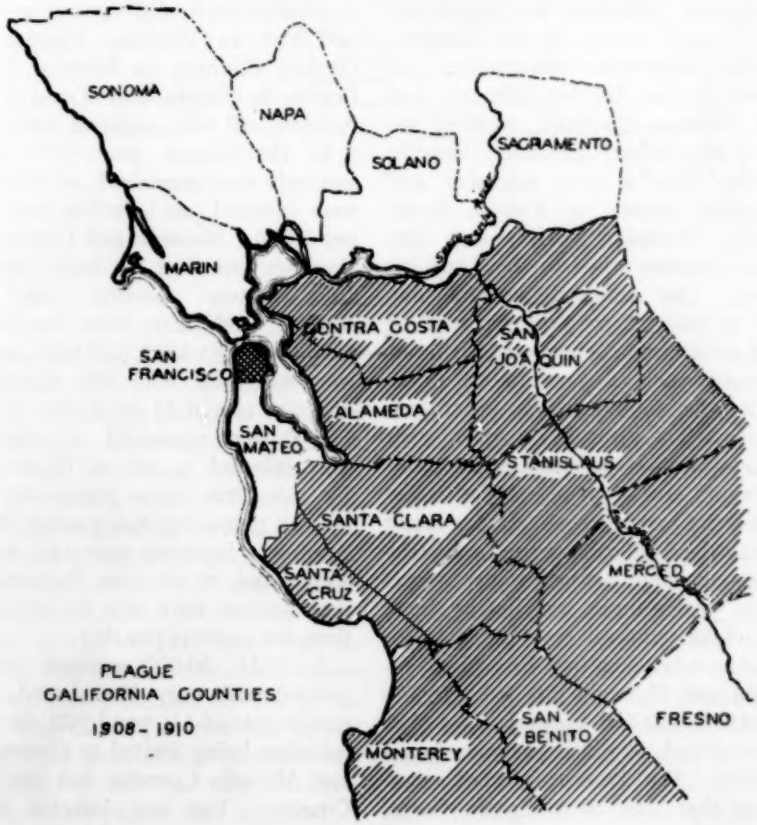
ably supported Dr. Kellogg in the bitter fight that ensued. Considering that plague was an exotic disease at that time and that in the United States its pathology and symptoms were comparatively unknown, the laboratory diagnosis made by Dr. Kellogg was a remarkable achievement and a tribute to his professional genius.

The announcement that plague existed in San Francisco was very bad news indeed to the commercial interests of California. The publicity obviously would deter tourists and injure business; therefore, the existence of plague was denied by the state administration, all of the San Francisco papers except one, and practically all commercial interests. A campaign was launched by the state officials, the San Francisco press, and the most eminent legal talent that Chinese money could buy, that for vilification and indecency reached an all-time low. The less said, the better, but those interested can obtain a vivid and interesting account of the whole affair in an article by Dr. W. H. Kellogg in the November, 1920, issue of the *American Journal of Public Health*. The one bright and redeeming feature of that sordid episode was the courageous and honest conduct of the San Francisco City Board of Health and the Mayor, who never at any time hesitated nor flinched in the performance of their duties despite the flood of scurrility and abuse. Suffice to say that within the next two or three years there were reported 121 cases of plague and 113 deaths, practically all confined to the Chinese quarter. The approximation of cases and deaths suggests that there must have been many other cases either concealed or erroneously diagnosed.

Because of the bitter opposition in part and partly because of inadequate epidemiological knowledge, the infection was pronounced eradicated in 1904, based solely upon cessation of human cases. No rodent survey was maintained and from subsequent developments, we know that the rodent infection was merely latent, to be spread throughout San Francisco after the catastrophe of 1906. Human cases ap-

peared in all parts of the city in 1907, and in that recrudescence there were reported 160 cases, probably substantially less than the actual number. I can recall seeing two cases then that had been treated—one, for tonsillitis, the other for mumps—both having cervical buboes. The real diagnosis was confirmed by post-mortem examination. If in 1900 there had been the same public support to the eradicative campaign that was accorded in 1907 and 1908, plague infection in this country might very well have been exterminated. The golden opportunity passed, however, and somewhere between 1900 and 1908 infection had extended into the ground squirrel population of California. In the latter year, a human case of plague was reported in Contra Costa County near Bay Point. An investigation resulted in the discovery of infected squirrels not far distant from the river wharves. In retrospect, it was recalled that a human case had been reported from that general locality in 1903. It seems probable that infected rats, either on a vessel direct from the Orient or from San Francisco, had landed at Port Costa or thereabout prior to 1903.

Upon the discovery of squirrel infection, there was instituted by the U. S. Public Health Service a campaign that at first was directed against the squirrels of Contra Costa County only, and in the remainder of 1908, there were 550 squirrels destroyed, of which 4 were infected. However, the occurrence of a case of human plague near Sunol,



Alameda County, in August, 1909, followed by a survey, revealed widespread infection among the Alameda County squirrels. From then on, the campaign expanded and infected squirrels were found in several of the contiguous counties.

In August, 1908, a human case occurred in the outskirts of Los Angeles, and an infected squirrel was picked up near the railroad yard where grain cars were unloaded. A survey of 2 years' duration, and covering the examination of rats in Los Angeles City and 23,000 squirrels throughout the Los Angeles County, failed to demonstrate any rodent infection in Los Angeles County, and made it apparent that the one infected squirrel found was probably imported by railroad car from the East Bay Region. That there had been no overland extension was supported by a 2 year survey of the southern counties, with the examination of squirrels in Los Angeles, Ventura, and Santa Barbara Counties, without revealing any rodent infection. Shortly following this, a very intensive and widespread survey of Fresno, Santa Barbara, Ventura, Tulare, and San Mateo Counties failed to show any infection. One infected squirrel was found in the extreme northern edge of San Luis Obispo County in 1910 but the examination of some 10,000 squirrels in the subsequent 2 years was negative. These results, together with negative findings in many other counties, would appear to refute the theory that plague had been existent for many years in the California ground squirrels.

The campaign against squirrels was slow in getting under way but by June, 1909, 5,000 squirrels in Contra Costa and Alameda Counties had been examined and 42 found infected. In the year 1910, 122,000 squirrels were shot and examined, of which 386 were found infected. The known infected counties at that time were Contra Costa, Alameda, Santa Clara, San Benito, Santa Cruz, Stanislaus, San Joaquin, and Merced Counties, with the greatest infection in Contra Costa and Alameda Counties. In the year 1911, 126,000 squirrels were examined with 55 infected. Intensive hunting and squirrel examination was instituted in San Bernardino, Riverside, Orange, and Imperial Counties, but no infection was found. A similar survey was carried out in Colusa, Napa, Solano, Mariposa, Madera, Tulare, Kern, and Fresno Counties, with likewise negative results. In addition to widespread hunting, poisoning and gassing of the infected areas was carried out vigorously during 1910 and 1911. Carbon bisulphide was the gas mainly used. About this time, it was noted that at least three passes through the Sierras were heavily squirrel-infested, and surveys were carried out in Washoe, Douglas, and Ormsby Counties in Nevada, Jackson County in Oregon, and several areas in Arizona—all with negative results.

In the (fiscal) year 1912, 56,000 squirrels were examined, of which 613 were infected, an infection rate of 11 per 1,000. Alameda and Contra Costa Counties furnished the bulk; one came from Fresno County; one, from Merced; and three, from San Joaquin County. In 1913, 30,000 squirrels were examined with 680 infected, an infection rate of 23 per 1,000. In 1914, 18,000 were examined, of which 177 were infected, a rate of 10 per 1,000. By this time, more stress was being laid on poisoning and gassing than on shooting. Squirrels were said to be so scarce east of the San Joaquin River that hunters were able to turn in less than one squirrel per day.

In 1915, 30,000 squirrels were examined with only 39 infected, an infection rate of 1⅓ per 1,000, the known infection being limited to Contra Costa and Alameda Counties and San Benito County. The last infected squirrel

from Merced and San Joaquin was in the summer of 1911—4 years previous. With this showing, the management of the campaign became unduly optimistic, and a very substantial reduction was made in the field force. Whereas the U. S. Public Health Service had expended over $200,000 in 1912, $118,000 in 1913, $133,000 in 1914, the expenditures were reduced to $51,000 in 1915. In other words, the field force was reduced by two-thirds. The contributive cause for this reduction by the U. S. Public Health Service was the necessity of using part of the epidemic appropriation to aid the City of New Orleans, where plague had appeared.

In 1916, 53,000 squirrels were examined, of which 138 were infected, from Alameda, Contra Costa, Santa Clara, San Mateo, Santa Cruz, Monterey, and San Benito Counties. This was the first instance of squirrel infection in San Mateo County—8 years after the discovery of plague in Contra Costa County. Surveys of Mendocino, Lake, Sonoma, Kern, and Madera Counties in 1916 were all negative, as likewise a 6 months' survey in Modoc and Lassen Counties in California and Jackson County in Oregon. Efforts toward eradication continued to decline in 1916 and 1917, and in the latter year hunting was employed sporadically.

Infection was found in squirrels in the south end of San Francisco County, an extension northward from San Mateo County. This was the first and practically last time an infected squirrel was reported in San Francisco County. In 1918, 10,000 squirrels from all counties were examined, with 32 infected.

The U. S. Public Health Service, which up to that time had financed the campaign, turned over the work to the County Horticultural Commissioners in Merced, Stanislaus, San Benito, and Monterey and the other counties to the south, and confined its efforts to the Bay Counties of Alameda, Contra Costa, and San Mateo. From the latter area, 72,000 squirrels were examined in 1919, of which 124 were infected, a rate of less than 2 per 1,000. From the beginning, there had been almost 2,000 infected squirrels reported from Contra Costa County, between 300 and 400 from Alameda County, 1 from Fresno County, 7 from Merced County, 1 from San Luis Obispo County, 38 from Monterey County, 78 from San Benito County, 18 from San Joaquin County, 32 from Santa Clara County, 14 from Santa Cruz County, 13 from Stanislaus County, and 19 from San Mateo County.

In 1921, because of limited funds, control measures were turned over to the respective county horticultural commissioners and the U. S. Biological Survey in all counties. Only limited hunting in the Bay Counties was carried out through 1921, 1922, and on up to 1927. Human cases in Santa Cruz, Alameda, and San Benito Counties made it evident, however, that there was still infection in those counties. In the spring of 1924, the infection took an upturn. There was an explosive epizoötic in San Luis Obispo, and in November of that year human cases appeared in Los Angeles. A survey of Los Angeles showed 9 infected squirrels, 7 being within the corporate limits of the city. In passing, it may be noted that the infection in Los Angeles may have been introduced through infected rats from a vessel or overland through infection in the ground squirrel population. It was significant, however, that no infection was found in the waterfront rats in Long Beach, Wilmington, or San Pedro, and also that the "marmot" type of infection prevailed in Los Angeles, *i.e.*, pneumonic form of plague. All the evidence, therefore, pointed to an introduction of the infection into Los Angeles through ground squirrels mingling with city rats in the suburbs.

Even before this, however, there had been a small outbreak of human bubonic plague of pneumonic type in Oakland in 1919, attributable to squirrel infection in Alameda County. In 1924, rat infection was found in the Oakland city dump. Here again, circumstantial evidence pointed to infection from the ground squirrels on the outskirts of Oakland and the possibility of an infected rodent being picked up dead and deposited in the household garbage and from there transported to the city dump where infected fleas lighted up epizoötic among Norway rats.

Except for desultory hunting, the campaign languished from 1920 to 1934.

From 1908 to 1917, the campaign against the infection of ground squirrels was financed and operated by the U. S. Public Health Service with contributions over varying periods from some of the county governments, but with no financial assistance from the state. The earlier attitude of the state administration was that of denying plague and criticising those who asserted its presence. Later on, active opposition ceased and a passive attitude was adopted.

In 1927, because of financial inability

by the State Department of Health to effect any broad eradicative measures, a marriage of convenience was effected whereby control of plague infection was turned over to the State Agricultural Department. This served the double purpose of utilizing a force already engaged in squirrel suppressive measures for economic reasons and at the same time did not unduly publicize the continued prevalence of the infection in California. The Health Department continued to make surveys, but the appropriation by the Legislature both for surveys and control has continued to be wholly inadequate and but a small part of what it should be in order to permit of any effective work.

During the next 6 years, plague infection extended southward, and a sharp outbreak was noted in 1934 in Kern and Tulare Counties in the San Joaquin Valley, and to the north in Modoc and Lassen Counties. From there, the infection apparently spread northward into Eastern Oregon and Eastern Washington.

Three years later, in 1937, the infection had been discovered in San Bernardino County in the southern part of the state and in El Dorado County and Placer County located in the east-central part of the state. A survey by the U. S. Public Health Service forces starting in 1935 showed in progressive years that the infection had spread into Nevada, Idaho, Montana, and Utah, gradually infiltrating into Arizona, New Mexico, and Wyoming.

In addition to ground squirrels, prairie dogs, wood rats, marmots, and various other wild rodents were found to be infected.

SUMMARY

With the exception of California, no state department of health in the infected area of the 10 western states has made any attempt to eradicate plague infection in wild rodents at any time, and during the past 20 years the U. S. Public Health Service, influenced by the indifference of state governments, has likewise attempted no eradicative campaign.

In the period 1909 to 1914, squirrel infection had been demonstrated in the San Francisco Bay Counties, in the San Joaquin Valley as far south as Fresno, and in the coast counties as far south as San Luis Obispo—an infected area of approximately 15,000 square miles—but by 1914, as a result of suppressive measures, the infection appeared to be delimited to a few scattered foci in Contra Costa, Alameda, Santa Clara, and San Benito Counties, and the infection rate had been reduced from 23 per 1,000 to slightly over 1 per 1,000 in the squirrel population.

The failure of early efforts to exterminate plague completely in California was due mainly to curtailment of funds influenced somewhat by unwarranted optimism at a critical period. In 1914, eradicative efforts reached high tide and might very well have been crowned with success had the campaign been sustained at that level for a year or two longer. Expenditures reflecting the scope of anti-plague measures in rural areas dropped from $133,000 in 1914 to $50,000 in 1915 and $25,000 in 1916, although the rebound of infection was not noticeable until later on.

The territory worked over was by no means a small one, being 15,000 square miles of demonstrable infected area, and an uninfected area approximately twice that large.

Plague from ground squirrels was reintroduced in Oakland in 1919 and again in 1924, and in Los Angeles through a similar avenue in 1924.

The extension of the infection through ground squirrels and other wild rodents has been slow: 8 years traveling the distance between Contra Costa and

San Mateo Counties; 16 years traveling from Contra Costa County to Los Angeles; 25 years traveling from the Bay Area to Kern and Modoc Counties.

CONCLUSION

So much of what actually happened in the spread of bubonic plague in wild rodents in California and neighboring states was hidden and obscured that any conclusions are largely based on deductions. From all the evidence available, however, it seems justifiable to conclude that representation as to the impracticability of plague eradication in the western states is not based upon the results of any serious attempt to combat the infection. Surveys, although informative, have been disconnected, superficial at times, and not substantially eradicative.

Plague infection as it exists today in the western states can be exterminated by a well organized and well sustained campaign throughout the entire plague area, adequately financed and probably covering a 5 year period. The results might very well be encompassed within the limitation of a $2,500,000 expenditure.

Unless controlled, plague infection can be expected to extend into any city in the western states having a substantial rat population. Likewise, there is no reason to assume that the infection will not spread to the rodents of the Great Plains and into the Mississippi Valley and Eastern United States.

Since the index of progress and the standard of eradication depends on laboratory examination of rodents, this latter should be continuous and coextensive with control measures. Negative findings over a period of two years or seasons, provided that an adequate supply of rodents from worked-over areas has been examined in the laboratory, should be an acceptable standard of eradication. Poisoning, gassing of burrows, and shooting should be coördinated, the latter procedure partly as a clean-up measure, partly for the purpose of producing specimens for laboratory examination as only a limited number of rodents are ordinarily recovered from poisoning and gassing procedures. The prolonged campaign is due partly to interruption of suppressive measures occasioned by the hibernation or estivation of many of the wild rodent species concerned. In some areas this permits application of eradicative measures for only a few months during the year.

While many species are involved, it is very probable that the main reservoir of infection is in ground squirrels, and that if infection is eradicated among these animals, it will spontaneously disappear in such species as the chipmunk, the marmot, wood rat, prairie dog, and other groups which do not have the density of population essential for the maintenance of an enzoötic reservoir.

Density of population is just as much a factor in the spread of infection among animals as it is among the human population. Total destruction of species is not essentially necessary in order to eradicate plague infection. This can be effected by a substantial reduction in the rodent population—sufficient to break the line of communication between infected and non-infected animals through the elimination of colonies and scattering of the population.

Inasmuch as the term "sylvatic plague," which has been used to designate the infection in rural animals, has created a misleading impression among some public health officials, this term should be discontinued as a synonym of bubonic plague.

NOTE: Since formulating the above report in May, 1941, it is to be noted that subsequently in June and July infected rodents were found by a Public Health Service Surveying Party in Divide County, N. D., and in San Miguel County, Colo.

Problem of Insecticide Spray Residue*

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MY subject deals with health hazards resulting from certain agricultural practices which bear directly upon general health. The many and varied sources of health hazards coming within the purview of public health officers are probably due not so much to entirely new ones as to sources hitherto existent, but unsuspected. Uncontrolled spray residue is a health hazard directly classifiable under the heading of those which have existed for many years, but about which little has been known or done until the last decade.

With increase in population and complexity of modern civilization, commercial practices have become standardized and single crop farming has largely succeeded subsistence farming. Large sections have become devoted exclusively to production of apples and pears, and in California entire communities are dependent upon these industries. The same is true with regard to celery, cauliflower, cabbage, and many other vegetables. With increased acreages and fewer isolated areas, menacing pests have increased and have necessitated greater application of poisonous insecticides. If these industries are to survive, the ravages of such pests as codling moth, corn ear worm, and other insect pests must be controlled. Increased application of insecticides was carried on without adequate regard to the problems of spray and dust residues and their removal.

If a farmer or fruit grower is to get a yield of marketable crops it is necessary to spray or dust with economic poisons, that is, materials for mitigating pests; but any deleterious spray or dust residue must be removed in preparing fruit or produce for sale for human consumption. Among the common potent and economical means of fruit and vegetable insect pest control is the use of lead arsenate, calcium arsenate, and fluorine compounds, such as cryolite—all recognized poisons. Until comparatively recently, spray residues from these remained just where they had been placed—on the apple skin, the celery stalk, or on the cauliflower curd, until they reached the purchaser; and then frequently were not removed in the preparation for consumption as food.

Many an individual boastfully will eat a fruit carrying spray residue to prove that it will not hurt him, and in most cases no acute poisoning occurs. The obscure chronic effects resulting from years of continued ingestion of minute quantities of lead, arsenic, or fluorine is the menace at which government spray residue regulations are directed. In order to benefit the consuming public, this knowledge had to be translated into proper laws which

* Read before the Western Branch American Public Health Association at its Twelfth Annual Meeting in San Diego, Calif., May 26, 1941.

would be adequately enforced. In California there did exist a statute which, when properly amended, provided a practical means of control.

The next step involved the patient education of growers. We went to farms; we made it clear that arsenicals and fluorine compounds could be used for pest control, but when necessary growers or shippers must acid-wash fruit and so trim or otherwise condition vegetables that they would be sent to wholesale and retail markets within legal tolerances of lead 0.050, arsenic trioxide 0.025, and fluorine 0.020 grain per pound respectively. In many cases the bureau has aided growers and shippers to evolve and develop methods, processes, and equipment useful for removing several types of spray residue from many kinds of produce rapidly, satisfactorily, and at low cost.

In the early days of enforcement there were dangers of acute poisonings, but these always were small in comparison with the dangers of chronic intoxication, that is, a slowly developing, insidious undermining of health with body changes and disabilities like those of chronic disease. As the result of years of conscientious enforcement of the Spray Residue Article of the Agricultural Code of California, it can be said that the possibility of acute illness as a result of spray residue is slight. Nevertheless, regardless of the general amelioration of the spray residue situation, careful enforcement should be consistently carried on, and probably we will always have to reckon with spray residue. If inspection were relinquished, no doubt the hazard would recur.

At the outset enforcement of this legislation met with indifference and often with an openly manifested hostility on the part of farmers, fruit growers, produce merchants, and others directly affected by the enforcement. However, it did not take long to put across the point that a few cases of acute poisoning would and did do great harm to marketing of their crops. There has been a tendency on the part of the general public to attribute to spray residue all types of food poisoning, often unfairly affecting the market for fruits and vegetables. Erroneous reports of such cases are as damaging as true ones. A false report of spray residue poisoning from broccoli at a country club in Los Angeles County published in the newspapers resulted in reduction in broccoli sales from eight carloads, on the day before the report, to six crates the following day. The Bureau of Chemistry of the California Department of Agriculture had passed to market this very broccoli when it analyzed one-fifth the tolerance allowed by law. The later obscurely published exoneration of the broccoli and the information that the poisoning was due to spoiled sandwiches did not restore the losses of the farmers, and it is estimated that this unfounded story produced a depressed market that cost farmers of California in reduced sales at least a half million dollars. We have tried to persuade newspapers to print only authentic cases of spray residue poisoning and not attribute to spray residue every stomach upset or slight fever. California newspapers now coöperate in this respect, and to do otherwise would only tend to frighten those who are adequately protected. There is no need for newspaper publicity, for the law is enforced.

Simultaneously with development of the systematic educational program, hearings were employed, which resulted in filing of criminal complaints in flagrant cases and for repeated violation. Fines and jail sentences were meted out by the court to wilful violators. To several of the more obstinate, fines of $500 and jail sentences of 6 months were very educational. Since the Agricultural Code of California became

effective in 1933, the bureau has carried on 104 prosecutions for violation of the Spray Residue Article. With the exception of one acquittal, a dismissal, and a jury disagreement, each has resulted in a conviction. The prosecutions resulted in average fines of over $100 and jail sentences of fifty days. The cases deserving prosecution have decreased to very few per year. This is significant when it is considered that in the great wholesale markets of Los Angeles alone, our inspection annually covers approximately 75,000 carloads of produce subject to spray residue. Growers and shippers now know that such fruits as apples and pears, and vegetables such as celery, cauliflower, broccoli, cabbage, peas, peppers, tomatoes, and sweet corn, can and must be commercially processed at origin to reduce spray residue to within legal tolerances.

In the case of certain California crops which are sent to eastern markets by the hundreds and thousands of carloads, such as pears, apples, celery, and peas, the agricultural groups concerned have initiated and borne the cost of official sampling and analysis of each carload at the shipping point, so that every car which moves interstate is certified to be within tolerance.

There always is the problem of possible metallic contamination of fruits or vegetables from sources other than spray for pest control. The bureau's system of inspection keeps this in mind. Several years ago we encountered an instance of vegetables contaminated with lead from a smelter stack. More recently, during regular routine spray residue inspection of a Los Angeles wholesale market, a sample of spinach was drawn which showed visible residue from application of nicotine sulfate-lime mixture, and in addition contained lead but no arsenic trioxide, raising the question of what lead compound was used. This prompted an investigation which disclosed that drift from lead paint spraying of a building had inadvertently painted the surrounding vegetation as well. The bureau coöperated in making a survey of damage produced on surrounding farms. The responsible firm recompensed the various growers to their satisfaction, and this substantial acreage of contaminated produce was not marketed.

It has *not* been shown that any substance that is toxic to insects is wholly non-toxic to man, so that any spray or dust residue, even though reputedly non-toxic to man, should be fairly well removed from produce before it is marketed. Removal also meets the requirements of the consumer who is skeptical of produce on which any spray or dust residues are visible. If this has not been previously done, it should be accomplished by the housewife.

The same bureau that deals with spray residue administers the forceful Economic Poisons Article of the Agricultural Code of California. Its general enforcement for protection of users is an independent story, and involves jurisdiction over nearly 5,000 materials intended for pest control of all kinds, including those used on fruits, vegetables, and many other products while they are being grown. There have been cases of misapplication of economic poisons through mistaking an arsenical spray or dust for one that would not leave a poisonous residue. There is a regulation under this article that any content of lead, fluorine, or arsenic in any form expressed as arsenic trioxide must be stated on the label of an economic poison intended to be applied to a food crop.

A proper label is the best protection of the public with regard to the manufacturers' packages of poison. However, labels may become illegible, detached, or may be handled by the illiterate, and also there is the problem

of safeguarding against unlabeled material which has been transferred from the original package. Besides properly labeling hazardous economic poisons, such as arsenic or fluorine compounds, they should be stored under lock separately from other types of materials. Only responsible persons ever should be allowed to supervise mixing and application of economic poisons likely to produce a hazardous spray residue. Any mixing drum, duster, spray machine, or other apparatus used for economic poisons containing lead, arsenic, or fluorine should be cleaned thoroughly before being used for a less hazardous economic poison.

In some cases a label may afford inadequate protection. A manufacturer should employ every reasonable auxiliary means available for safeguarding the public. A dangerously poisonous material in so far as possible should carry its own warning. A warning may be inherent in the product, or it may be added. Aside from labeling, auxiliary means of identifying economic poisons in order of their importance are sight, smell, taste, touch, and hearing. Coloration may be an excellent supplement to labeling of poisons; a trace of a repulsive, pungent odor, in some cases might serve to warn the public; and an added disagreeable taste might prevent a person or domestic animal from eating or drinking it. The type of container has a bearing on protection. It has been suggested that the public be educated to associate with poisons a triangular, prickled or ridged bottle, or other type of protective package such as a rattle bottle cap. The important consideration in any of these auxiliary means is to make it obvious that they are poisons. All phases of this problem are now under careful investigation by the industries involved.

Before any auxiliary safeguard, such as a warning color, can be applied, a great deal of investigation should be carried on. In selecting a protective color, solutions resembling whiskey, wine, or other beverage should be avoided. Certain insects are repelled by some colors, and also some colors may be unacceptable as food to definite species. Agricultural insecticidal and fungicidal sprays and dusts should not be impaired by requirements diminishing effectiveness. Any auxiliary safeguard may have a definite limitation, but the protection afforded by an adequate and proper label cannot be overemphasized.

Spray residue control work comprising the inspection and analysis of fresh fruits and vegetables is carried on in California at all the principal wholesale, drive-in, and roadside markets throughout the state. The mechanism is well organized and the work well performed. Deciduous fruits with deleterious spray or dust residue in excess of legal tolerance are not allowed to be stored at points outside the district of production nor to be shipped, except under restricted permit for by-product use or for conditioning in a recognized acid-washing plant.

Any economic poisons spray or dust that will leave an over-tolerance amount of residue on any food crop should be of such composition and application that its removal can be effected before the crop is marketed. Hydrochloric acid washing of all fruits if any spray at all has been used is deemed advisable.

The mere fact that fruit may have been washed in acid one, two, or more times does not have a bearing if illegal spray residue has not been removed. The law provides that fruit and produce are unsalable unless they meet specified requirements. Quarantining of any product carrying spray residue in excess of tolerances in markets of cities and towns of California is a routine procedure. It is not sufficient for a person to be willing to recondition his product

after the presence of excessive residue is discovered on it in the market, and such disposal of quarantined products in no way relieves the person responsible for violation of the law from the possibility of prosecution. Imported fruits and produce must meet the same standards required for California products.

Except for some half dozen of probably 100 economic poisons basic materials in use or proposed, there are meager toxicological data available, and not a great deal is definitely known of the potential health hazards connected with them. Many of them are powerful agents, and the public, industry, and government have become increasingly conscious of their potential harm to consumers, workers, plants, and animals, and as a permanent contaminant of soil. When a chemical is not acutely poisonous, little is known generally as to its potentialities for chronic injury. Tolerances have been established only for lead, arsenic trioxide, and fluorine, although possibly several other substances are more or less noxious. Recently a flurry has extended beyond the steel industry as to possibility of health hazards from use of manganese. Formerly we believed this element relatively non-toxic. With its use extended from manganese dioxide dust to increased industrial purposes and to tree sprays, it has been demonstrated that the hazard is not simply due to inhalation of dust particles, but eventually there are central nervous and liver disorders.

In view of the present attention being paid to defense, conservation of human well-being is of utmost importance. The commercialization of an insecticide poison often is attempted as soon as the new toxicant has emerged from the laboratory, frequently with little or no pharmacological information. Before there is commercial exploitation and introduction into homes for intimate contact with unsuspecting users, more data as to acute or chronic intoxication should be available. The determination of toxicities of economic poisons is imperative. This type of work can be carried on more expeditiously and effectively in California than elsewhere because this state uses approximately one-third of all economic poisons consumed in the United States and probably uses them in a greater variety of ways than all the rest of the states together. A Works Progress Administration project sponsored jointly by the State Director of Public Health and the Chief of the Bureau of Chemistry has been arranged for determinations of toxicities of economic poisons to be carried on at the University of Southern California. This project is comprehensive in scope and can make a real contribution to the economic poisons branch of science by anticipating industrial hazards.

Present tolerances include only inorganic substances, but some organics may hold distinct danger. All new economic poisons are examined on the basis of present knowledge as to any hazard that might exist in their use, but there may remain the possibility that a hazard be not anticipated, and that there may be unforeseen injury. Public health officials always should keep in mind spray residue, as it may account for some otherwise unexplainable illness, or help solve some particular problem that may unexpectedly appear. At the same time, one should be aware of the danger of premature and ill advised publicity.

Enforcement work must be reasonable, avoiding hysteria, and simultaneously evaluate all factors. It is unfair knowingly to exaggerate a case to the extent that people, in order to escape a hypothetical danger, will avoid sprayed products entirely, and thereby deprive themselves of valuable foods. With the continuation of careful en-

forcement, the proportion of low-residue fruits and vegetables continues to be satisfactory. Any foreign chemical substance on vegetables should be removed before they are eaten. In controlling spray residue for protection of the public, it is the duty of a health officer to protect the reputation of produce from false report. In view of the thorough spray residue work being carried on, we will appreciate your continued conservatism in attributing illness to spray residue, for otherwise innocent farmers may be economically injured from failure to sell their produce on account of unfounded suspicion.

Milk-Borne Disease in Massachusetts 1933-1940*

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PREVIOUS chronological reports of milk-borne disease in Massachusetts have been published covering varying periods, the last in 1933.[1] The 8 years covered in the present report have been characterized by further improvements in the regulations regarding the safeguarding of milk and a further diminution in the number of milk-borne outbreaks. This low prevalence of milk-borne disease over a long period of years clearly demonstrates that the efforts expended in safeguarding this important food supply pay ample dividends.

CHANGES IN CONSUMPTION AND CONTROL

In order to learn the changes which have occurred in the consumption and the sanitary control of milk, questionnaires were sent to the 187 Massachusetts cities and towns with populations of more than 2,500. Replies were received from 166 communities, 23 of which did not give sufficient information to be included in the tabulations. The 143 communities giving satisfactory figures (Table 1) represent 90 per cent of the total population of the state.

TABLE 1

Communities Answering Questionnaire

Group		*Number of Communities in Group*	*Number Answering Questionnaire*	*Per cent Answering Questionnaire*	*Population of Group Answering Questionnaire* *
50,000 and over	(I)	16	16	100.0	2,219,593
25,000–50,000	(II)	16	15	93.3	598,630
15,000–25,000	(III)	25	24	96.0	450,255
10,000–15,000	(IV)	21	20	95.2	241,066
5,000–10,000	(V)	47	35	74.7	249,962
2,500– 5,000	(VI)	62	33	53.3	112,232
		187	143	77.8	3,871,738

* 1940 Federal Census for State: 4,316,721

The per capita consumption of milk has shown a slight but progressive decrease since 1926. The estimate in this report is 0.42 quarts per day, as compared to 0.44 in 1931, 0.45 in 1928, 0.50 in 1926, 0.46 in 1923, and 0.56 in 1919. There has been a progressive increase in the per cent of the population represented in the later reports, insuring a more representative estimate. These figures include only milk sold and do not take into consideration any produced for private consumption.

* Seventh Chronological Report from the Massachusetts Department of Public Health.

There has been a very satisfactory increase in the amount of pasteurized milk consumed. It will be seen from Table 2 that, since 1919, there has been quite a steady increase in the per cent of milk pasteurized among the communities which have answered the questionnaires. The larger communities have consistently reported higher percentages pasteurized (Table 3). At the present time there is very little milk sold in communities of 25,000 or over which is not so safeguarded. Even in the communities between 2,500 and 5,000 population more than half of the milk sold is pasteurized at the present time.

TABLE 2

Per cent of Milk Pasteurized in Communities Answering Questionnaire

Massachusetts

Year	Communities Answering Questionnaire: Number	Communities Answering Questionnaire: Per cent of Pop. of State	Per cent of Milk Consumed Which Is Pasteurized
1919	..	61.0	34.0
1923	41	65.0	74.0
1926	43	70.2	83.0
1928	95	83.0	85.7
1931	90	83.4	89.7
1939	143	90.0	92.4

Since the figures in Table 2 represent only those communities answering the questionnaires, an estimate was made for the state as a whole using all of the information at hand. It appears that over 90 per cent of all milk sold in the state is now pasteurized, as compared to about 85 per cent in the previous report. Similar estimates were made by counties. As would be expected, those counties in which the preponderance of the population was urban had high percentages of milk pasteurized, while the rural counties showed lower percentages. The highest percentage was 99.8 per cent, the lowest 47.1 per cent.

One of the reasons for the marked increase in the use of pasteurized milk is that during the years which have passed since the last chronological report, the number of communities which require that all milk be either pasteurized or certified has increased from 12 to 78. The distribution of these 78 communities in the various population groups is shown in Table 4. It will be seen from this table that three-fourths of the population of the state is now contained in these communities in which milk is thoroughly safeguarded.

TABLE 3

Per cent of Milk Pasteurized in Communities Answering Questionnaire by Size of Community

Massachusetts

Group		1923	1926	1928	1931	1939
50,000 and over	(I)	82.3	91.6	93.0	96.1	99.5
25,000–50,000	(II)	65.1	63.9	84.5	89.5	95.0
15,000–25,000	(III)	43.4	35.6	61.2	80.0	85.0
10,000–15,000	(IV)	10.8	34.1	62.1	59.8	75.4
5,000–10,000	(V)	....*	....	51.9	55.3	65.0
2,500– 5,000	(VI)	....†	....	....	....	58.5

* Questionnaires were not sent until 1928.
† Questionnaires were not sent until 1939.

There does not seem to have been any material change in the consumption of certified milk. In 1939 it is estimated that 0.58 per cent of the total milk sold was certified, as compared to 0.6 per cent, 1.0 per cent, and 0.62 per cent for the years 1926, 1928, and 1931, respectively. The apparent increase in 1928 may very well have been due to a difference in the way in which the information was collected or interpreted. Those purchasing this premium milk at the present time are apparently doing

TABLE 4

Communities Requiring Milk to Be Pasteurized or Certified

Massachusetts

1941

Group		No. of Towns in Group	No. of Towns Having Regulation	Per cent of Towns Having Regulation	Population of Group	Population Having Regulation	Per cent of Population Having Regulation
50,000 and over	(I)	16	16	100.0	2,219,593	2,219,593	100.0
25,000–50,000	(II)	16	15	93.8	623,963	586,568	94.0
15,000–25,000	(III)	25	18	72.0	474,123	331,939	70.0
10,000–15,000	(IV)	21	8	38.1	252,004	93,287	37.0
5,000–10,000	(V)	47	8	17.0	336,769	57,189	17.0
2,500– 5,000	(VI)	62	6	9.7	216,362	21,170	9.8
Under 2,500	(VII)	164	7	4.3	193,907	12,975	6.7
		351	78	22.2	4,316,721	3,322,721	77.0

so not because it is raw but because it is a high quality milk, as evidenced by the fact that more than three-fourths of the certified milk sold in the state is estimated to be pasteurized.

There has been a further increase in the control of the quality and safety of milk as evidenced by the fact that the number of bacteriological examinations in 1939 averaged 10.9 examinations per 100,000 quarts of milk sold in comparison to 6.6, 5.4, and 4.9 in the years 1931, 1928, and 1926, respectively. An increase of 100 per cent in such examinations since 1928 is evidence of the interest of boards of health in protecting their milk supplies. There has been some increase in the number of boards of health which make such examinations (Table 5).

In the 143 communities which answered the questionnaire, 47 have milk inspection work carried out by full-time employees. In some instances the same employee performs other duties for the board of health. Eighty-five of the communities have a part-time milk inspector, and only 11 have no milk inspector, 10 of these being in the communities of under 10,000 population. As would be expected, the communities with larger populations employ proportionally more of the full-time milk inspectors.

OUTBREAKS TRACED TO MILK

Because the most potent factor influencing the passage of milk regulations is usually the occurrence of a milk-borne outbreak, it seems paradoxical that the most rapid progress in passing requirements for the pasteurization of milk should have occurred in the last two years at a time of low prevalence of milk-borne disease. Part of this is due

TABLE 5

Per cent of Communities Answering Questionnaire Which Make Bacteriological Examinations

Massachusetts

Group		1928	1931	1939
50,000 and over	(I)	94.1	100.0	100.0
25,000–50,000	(II)	63.6	61.5	81.2
15,000–25,000	(III)	63.7	76.4	71.0
10,000–15,000	(IV)	60.0	52.9	70.0
5,000–10,000	(V)	30.0	46.2	48.6
Total		57.9	65.7	68.3
2,500– 5,000	(VI)	....*	....	42.4
Total				62.5

* No questionnaire sent until 1939

TABLE 6

*Total Outbreaks and Total Cases of Milk-borne Disease **

Massachusetts

Period	Outbreaks		Cases		Cases per Outbreak
	For Period	For Year	For Period	For Year	
1886–1890	3	0.6	104	20.8	35
1891–1895	4	0.8	224	44.8	56
1896–1900	15	3.0	308	61.6	21
1901–1905	20	4.0	410	82.0	21
1906–1910	28	5.6	2,878 †	575.6	103
1911–1915	45	9.0	4,255	851.0	95
1916–1920	32	6.4	1,287	257.4	40
1921–1925	17	3.4	444	88.8	26
1926–1930	14	2.8	1,659	331.8	119
1931–1935	7	1.4	220	44.0	31
1936–1940	4	0.8	331 ‡	66.2	83

* Includes typhoid fever, diphtheria, gastroenteritis, scarlet fever, septic sore throat and undulant fever.
† First period in which septic sore throat was included. The large figures in this period, however, are due mainly to milk-borne scarlet and typhoid.
‡ First period in which gastroenteritis and undulant fever were included.

to the continued endorsement and active advocacy of such action by representatives of the department and other public health officials, but in many instances action has been taken spontaneously because of the pressure of public opinion in the community.

The great impetus to place safeguards around milk in Massachusetts was given by milk-borne septic sore throat, which was striking one community after another in the years immediately following 1911. The use of pasteurized milk increased progressively, occasional outbreaks of milk-borne diphtheria, scarlet fever, or typhoid fever giving further emphasis to the need for such safeguards. The large outbreak of nearly 1,000 cases of septic sore throat with 48 deaths in Lee in 1928, however, initiated the action by local boards of health to require pasteurization or certification of all milk sold. Beginning with Boston in that year, the communities in the state have one after another required that only safe milk may be sold.

As would be expected, the number of outbreaks of disease traced to milk has shown a further decrease since the last report. From the peak of 45 outbreaks in the period 1911 to 1915, which was an average of 9 per year, the last 5 year

TABLE 7

List of Outbreaks Traced to Milk

Massachusetts

1933–1940

Year	Month	Place	Disease	Cases	Deaths	Source	Milk Pasteurized or Raw
1933	Feb.	Weymouth Hingham Quincy	Scarlet Fever Septic Sore Throat	43	2	Carrier	Raw
1933	April	E. Bridgewater and W. Bridgewater	Scarlet Fever and Septic Sore Throat	57 38	0 0	Cow	Raw
1936	Jan.-Oct.	Pittsfield and vicinity	Undulant Fever	7	0	Infected Herd	Raw
1936	Oct.	Groton	Gastroenteritis	35	0	Cows	Raw
1939	Mar.-Dec.	Petersham Gardner	Undulant Fever	5	0	Infected Herd	Raw
1940	June	Dighton Taunton	Sore Throat	284	0	?	Raw

period (1936 to 1940) showed only 4 outbreaks, which is less than one per year (Table 6). It will also be noted that the number of cases per year has declined from over 850 to 66.

The milk-borne outbreaks which have occurred since the last chronological report are listed in Table 7. In this period only two deaths have occurred among such cases, neither of them within the last 5 year period. No cases of diphtheria have been traced to milk since 1925, and no milk-borne outbreaks of typhoid fever have been recorded since 1932. The last scarlet fever outbreak occurred in 1933. The milk-borne disease which is occurring at the present time is largely limited to streptococcic sore throat and undulant fever. It should be particularly emphasized that all of the outbreaks recorded in this report occurred upon raw milk routes.

DISCUSSION

It is encouraging to discover that the use of milk is apparently not declining appreciably. The per capita consumption is almost as high as was recorded in the years 1928 and 1931. This indicates that the people of the state have become thoroughly convinced of the value of milk as a food and continue to include it in the family diet, even in years when food budgets have been materially restricted.

That milk is one of the safest foods consumed in Massachusetts is conclusively demonstrated by the low level of milk-borne disease at the present time. This splendid record is of course due to the fact that over 90 per cent of the milk consumed is safeguarded by being pasteurized. Not only do we have a safer milk through pasteurization, but the general sanitary quality is further guaranteed by an increase in the number of bacteriological examinations being carried on by local boards of health.

One remarkable change in trend is recorded in this report. In 1932 we were rejoicing that 143 communities, representing 85 per cent of the population of the state, lived in communities where regulations were in force requiring that all milk be either pasteurized or from tuberculosis-free cattle. Today 78 communities have regulations requiring that all milk be either pasteurized or certified, and nearly 80 per cent of the people of the state now reside in communities which have such regulations.

SUMMARY

1. Milk-borne disease continues to decrease in Massachusetts. Only 4 outbreaks traced to milk have occurred in this state within the last 5 years.

2. There has been a slight but progressive decrease in the per capita consumption of milk since 1926.

3. Seventy-eight communities, representing nearly 80 per cent of the population of the state, now have regulations requiring that all milk be either pasteurized or certified.

4. It is estimated that over 90 per cent of the milk consumed in the state is pasteurized.

5. There has been a further increase in the number of bacteriological examinations performed to guard the quality of milk.

REFERENCE

1. Bigelow, George H., and Feemster, Roy F. Milk-borne Disease in Massachusetts, 1930–1932. *A.J.P.H.*, 23, 6:571 (June), 1933.

Wartime Protection of Water Supplies*

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WARTIME protection of water supplies may be divided into three stages of precautionary measures: The first pertains to the organization of the water department itself, together with necessary precautions against wilful damage or sabotage. This problem is particularly important prior to actual outbreak of war. The second stage is to provide, in advance, a proper organization to store supplies, make repairs, and guarantee delivery of safe water against damage resulting from actual warfare, similar to the present situation in the cities of England. The third is the development of precautionary measures to take care of poisonous and war gas pollution of water supplies which so far has not become a question in the present warring countries.

SABOTAGE

Water supplies in general are exceedingly vulnerable to wilful damage or sabotage.[1] A number of cities have set up precautionary measures against sabotage, including the City of New York,[2] Nassau County, N. Y.,[3] and the City of Los Angeles. The articles on sabotage which have so far appeared in the literature [1-5] stress the following:

1. Visitors and trespassers, including employees other than those specifically assigned, should be prohibited access to water treatment plants and reservoirs even to the point of stationing police at justified locations.
2. Affiliations and activities of every employee should be investigated, and no employee should be an alien. A person who has applied for first papers but who is lacking in progress toward naturalization should be dismissed.
3. Non-coöperative and disloyal employees should be dismissed.
4. Each employee whose business it is to enter treatment plants, reservoir sites, and pumping plants should be provided with a pass appended to which is his photograph.
5. Employees stationed at reservoirs and treatment plants should notice and report all actions of strange persons in the vicinity.
6. Reservoir watersheds should be patrolled regularly by patrol cars and local reservoirs, particularly the larger ones should be guarded with aid of motorcycles.
7. All reservoirs and treatment plants should be provided with external night lighting facilities.
8. All sportsmen should be prohibited from reservoirs and dams.
9. Airplanes should be prohibited from crossing reservoirs overhead and those doing so should be identified and reported.
10. Isolated manholes on gravity lines and treatment facilities outside of fence enclosures should be depressed, covered with sod, locked and hidden.
11. Radio communication should be established as a routine procedure through police channels.
12. Small reservoirs and all treatment works should be adequately fenced and placarded.
13. Water treatment operators should be armed and be sworn in as police deputies.

* Read before the Western Branch, American Public Health Association at the Twelfth Annual Meeting in San Diego, Calif., May 28, 1941.

14. Boats on reservoirs should be provided with night lights.
15. Chlorination should be practised at all main outlets to reservoirs.
16. More frequent bacteriological analyses should be made.
17. Health officials should coöperate with local water department officials and issue orders where practical to bring about the greatest possible conformance with these standards.
18. Where advisable, contacts with FBI agents should be established.

WARFARE PROTECTION

In England considerable preparation was made in 1939 to minimize damage from possible bombing and warfare tactics prior to the outbreak of war as reported in various issues of *The Surveyor*. The issue of January 24, 1941, states that the Metropolitan Water Board of London not only successfully maintained an adequate water supply throughout terrific bombing, but also preserved its standards of purity. Furthermore, it has not been necessary to curtail domestic or yard consumption. Experiences of other English cities are included in the Abstracts of American Water Works Literature, Defense Section, *Journal of the American Water Works Association*, Vol. 33, No. 4, pages 779–800, which mutely testify to the adequacy of prevision preparedness of the English cities.

The English writers report that high explosive bombs range from 100 to 1,000 lb. each and that protection from splintering from a 500 lb. bomb dropped 50′ away requires 1½″ of mild steel, 13″ of bricks in cement, 12″ of reinforced concrete, or 2½′ of sand or earth protecting doors and windows for a vertical distance of 6′. It is further reported that bombs have struck buried 18″ water lines, throwing 100 lb. sections 100′ distant, and a single bomb has destroyed 600′ of 48″ water line. It is further reported that bombs have incapacitated buried water lines, destroyed fire hydrants, thrown building debris on to streets which buried fire hydrants and valve boxes, caused breaks in water service connections, and have created craters exposing broken ends of water and sewer lines simultaneously.

The English practice has included: camouflaging of dams, particularly of the earth type, and reducing the high water mark by at least 5 feet; maintenance of a supply of filled sand bags on barges to repair bomb damage to earth dams; installation of valves on outlets to reservoirs in addition to the tower outlet valves; construction of by-passes around reservoirs; installation of additional valves near hydrants; establishment of better maps and records to replace the "grand old man of the department"; establishment of extra repair crews with reserve repair materials; provision of portable chlorinators, pumps and lights; provision for emergency connections between private wells and other sources of water supply; provision for duplicate sources of municipal water supply; constant repairing and checking of all valves; storage of adequate supplies of fuel and coagulants; concentration on the quick shutoff of broken house services to prevent waste and flooding of shelters; provision for by-passes around all water purification plants; camouflaging of water towers; provision for automatic closing of valves on trunk lines due to drops in pressure from bombing; ample storage of flexible screw and victaulic couplings; mobilization of plumbers who can be assigned to assist in distribution system repairs; and making of valve boxes for quick location.

Enemy action in England has tested to the utmost the adequacy of prevision and emergency actions together with resourcefulness and energy of water works officials to meet the heavy demands for fire protection and repairs to damages to the distribution system caused by warfare.

The lessons gleaned from the English experiences show that there is need of greatly increasing the number of duplicate sources of supply as well as having interconnections with different power systems and emergency Diesel engine operation. The present war year finds England spending over 5 million dollars for augmenting supplies for municipal purposes. At the present time, as indicated by announcements in *The Surveyor* and *Engineering*, the English apparently feel the need of additional personnel training in sanitary engineering as well as design engineers. Extension requests for emergency water supplies secure priority so far as public engineering defense measures in England are concerned. The principal item in wartime protection should be the maintenance of an adequate personnel to include not only repairs but design, as well as an adequate staff to control water quality. It is noteworthy that practically all news pictures showing immediate damage in England have fire streams showing that water has been continuously available for fire protection. The English practice in the sterilization of small mains has been the addition of sodium hypochlorite solutions or calcium hypochlorite powder to obtain a dose of 10 p.p.m. and hold for 15 minutes prior to flushing and subsequent use. They have also equipped every water department with portable chlorination equipment for emergency disinfection.

Emergency operation has been particularly important. It has been necessary to isolate certain areas where delayed bombs exist, to install taps at fire hydrants so that civilians can get drinking water, and to make temporary connections on the surface of the ground with temporary runarounds. In one instance, enemy bombing was so persistent on an 18″ trunk line aimed apparently to interfere with fire protection in the city being bombed, that it required one week to repair 72′ of 18″ line, which work would ordinarily have been completed in a few hours' time.

The Ministry of Health has ordered sterilization of damaged water mains where sewage is present prior to resumption of service; and has directed cities to notify consumers to boil water whenever breaks in the distribution system might cause sewage under a head to reach consumers due to breaks in remote but higher trunk lines before valves can be closed.

Two of the greatest public health dangers in connection with wartime damage to distribution systems is the deliberate use of the distribution system with other sources of water supply which may be polluted, for fire protection and the possibility of water mains being polluted during repairs either from ground water containing sewage or back-siphonage from buildings. During war periods there are great shifts in population as well as development of army camps, which accelerates back-siphonage conditions. At camps it is frequently necessary to shut off main lines for short times for repairs and alterations, which subjects adjacent buildings to back-siphonage conditions. There should be a definite program established to install valves which will prevent back-siphonage on large public buildings and army camps where cross-connections are known to exist. A list of such cross-connections and types of buildings where they are likely to exist is given in the article by the writer.[6]

The health officer and sanitarian must play an important rôle coöperating with water department officials in the matter of making connections with dual water supplies, in controlling back-flow and back-siphonage with suitable installation of mechanical devices and to advise on the sterilization of broken mains. All of these problems are of peacetime significance and should be

worked out even though the possibility of warfare were nonexistent.

PRECAUTIONS FROM POISONS AND GASES

While it might seem premature to take necesary steps to determine the presence of poisons and war gases deliberately added to water supplies or gaining access through war activities, there is need for the public health officer to know what the most likely poisons are, how they can be detected, and how they can be counteracted. Fortunately, up to the present time water supplies in Europe have not been involved in poisoning tactics. Nevertheless, the increasing discharge of trade wastes into sewers and streams which ultimately reach water supplies below involves many poisons which might be used in warfare. It is appropriate to give the subject serious consideration just in the matter of stream pollution alone.

Except for a few scattered hints in field manuals, very little authentic literature is available on the subject of poisons and water supply. The practice in England, in cases where poisoning might be anticipated, includes such instruction as: boiling of water if mustard gas is present to hydrolyze the gas into harmless compounds; by-passing and emptying of reservoirs containing arsine gases such as "lewisite" and diverting a portion of the supply through trout fish tanks to test the water on sensitive fish.

A study of poisons and war gases shows that there are a considerable number of substances which should be given serious consideration by public health officials. These include:

1. Arsenical compounds
2. Heavy metals
3. Cyanides, cresols, and phenols
4. Glucosides and alkaloids
5. War gases

Arsenical compounds may be either organic or inorganic, the latter being toxic in amounts greater than 0.15 p.p.m. and the former being far more dangerous. Arsenic has also been added to the newer types of war gases such as lewisite and ethyldichloroarsine which may cause death through absorption from a wound created by the gases themselves. Such gases are known as blistering gases, and even after they have hydrolyzed in water may still possess blistering characteristics.

Heavy metals include not only the soluble inorganic salts of lead, mercury, barium, copper, and zinc, but also organic substances containing metallic poisons which are far more toxic than the inorganic compounds. The heavy metals in organic combination are exceedingly toxic and are not eliminated by body fluids. They do not ionize and do not precipitate so that they can be eliminated. Hence it is important to differentiate between metals in organic and inorganic solution. An example of this is the tetraethyl lead in gasoline which is extremely poisonous.

The cyanides, cresols, and phenols similar to those in some trade wastes reaching streams are toxic at 30–60 p.p.m. and produce taste in concentrations far less.

The glucosides and alkaloids are particularly troublesome. The glucosides are saponins which sud easily and if combined with chromium and other heavy metals which are used for slime control in industrial cooling towers, are extremely poisonous. The syanogens, glucosides, and the digitalis group of saponins are toxic at 10 p.p.m. or less.

The most common alkaloid poisons are nicotine and strychnine, although there are others more deadly. Nicotine sulfate is known as "Black Leaf 40" and is used in the control of pests. Strychnine, which is not as dangerous, is frequently used in rodent control. All alkaloids give a bitter taste to water but may be toxic at concentrations too low to taste. While many of the alka-

loids are soluble only as acid salts, there are many which remain in solution on the alkaline side. Colchicine and nicotine are freely soluble in alkaline water and their toxicity is less than 1 p.p.m.

Of the fifty to sixty war gases developed at the end of the last war, the three main groups of interest here are: (1) the arsines, derivatives of which are toxic in water solutions; (2) mustard gas; and (3) gases liberating hydrocyanic gas. The arsenical gases include adamsite, lewisite, methyldichloroarsine, ethyldichloroarsine, phenyldichloroarsine, diphenylchloroarsine, diphenylaminecyanarsine. Some of these gases, including the second to fourth mentioned above, are vesicant after hydrolysis. The toxicity based on arsenic is about 0.15 p.p.m. Mustard gas is toxic at about 40–50 p.p.m., but is soon hydrolyzed provided adequate dilution is available, and is therefore harmless so far as complications in water supplies and sewerage works are concerned.

From the practical standpoint, toxic doses of any of the above mentioned poisons could easily reach reservoirs or sewers. A single large airplane or a fleet of small planes could place 10 tons of material in a reservoir in a single attack. If the reservoir is of 10 million gallons capacity, then such a dose would give a concentration of 24 p.p.m. which is above the toxic limits of most of the poisons above mentioned. A reservoir so polluted might have to be emptied at once. The discharge of a reservoir so polluted into a sewer system would readily admit excessive poisonous doses into it. The deliberate addition of chemicals into the water distribution system through house services by pumps, air compressors, or steam ejectors is possible.

Certain materials if dumped in a reservoir would require long periods to mix or to hydrolyze, and their pernicious effects might slowly increase.

At the Sewage Works Spring Conference at Salinas, Calif., the writer suggested that the following tests be utilized in the matter of taking necessary precautions against poison from wartime activities:

TESTS ON POISONS

So far, the literature on tests for poisons has been limited to field army tests. Much literature on war gases so far as universal application is concerned, is in error because of subsequent changes in gas manufacture, difference in impurities and variance in the conditions of testing. In this new field the ordinary tests used in water and sewage treatment plants do not cover the needs of the laboratory technician. There is need, first, to understand correlations in variations of present analyses with war gas poison pollution; second, to develop qualitative tests for the detection of arsenic, mercury, and cyanide; and third, to give serious consideration to a future program for a more complete schedule of tests to cover the entire field.

1. *Interpretation of Present Tests*

The operator should always be on his guard to notice variations in the common tastes and not to regard abnormal variations as "flukes."

(a) *Chlorides*—The chloride determinations at sewage treatment plants vary considerably reflecting various amounts of ground water, peak sewage flow, and the discharge of industrial wastes. However, in sewages normally high in chlorides which suddenly show an abnormally low chloride content, there might have been the addition of silver, mercury, or lead. The operator should, therefore, be on the watch for an unusual variation even in this simple chloride test. Abnormally high chlorides might indicate the hydrolysis of war gases, most of which contain chlorine.

(b) *Sulfates*—If sulfates are normally present in the sewage, a low determination might be due to the addition of lead or barium salts. An increase in sulfates may be caused by the addition of copper or zinc sulfate. A few gases have sulfates as hy-

drolysis products, hence an increase in sulfates may be due to some war gases.

(c) *Oxygen Consumed*—Although the oxygen consumed value varies in raw sewage, any large increase may be due to war gases, glucosides, akaloids, or phenols. This test is an immediate indication of danger and where the oxygen consumed is greater than what normally might be expected, as a normal correlation between oxygen consumed and physical appearance of the sample, suspicion of the operator should be aroused and additional tests made.

(d) *Biochemical Oxygen Demand*—Any sudden increase in biochemical oxygen demand above normal expectancy would be due to organic substances in rather minor amounts and of hydrolyzed war gas products. It is easy to see how the biochemical oxygen demand might be abnormally low in the presence of metallic poisons, glucosides, and alkaloids, and war gases if present in toxic amounts. These materials would have to be destroyed or removed before authentic biochemical oxygen demand results could be obtained, just as in the case of determining biochemical oxygen demand in the presence of free chlorine.

(e) *pH*—Most war gases hydrolyze in water and produce acid which lowers both the alkalinity and pH. In distilled water the pH may be reduced to 2.0. In reasonably good drinking water a pH of 4.0 is not unreasonable. The depression of pH in sewage because of increased buffering action would not be so marked, yet it might be measurable. Barium hydroxide in excess would cause an increased pH.

(f) *Grease*—War gases are usually dissolved in wood alcohol, acetone, or benzene, and such materials if discharged into sewers would pick up grease and cause erratic grease results in treatment plants.

(g) *Nitrates*—Since many of the heavy metallic poisons are soluble and available in the nitrate form, those plants running the nitrate determination should be on the lookout for abnormal variations.

(h) *Odor*—While not too much stress should be paid to odor because gases can be cleverly masked to conceal odor, nevertheless most gases have a characteristic odor which can never be forgotten. When once an operator has noticed a certain odor he should identify it as near as possible to its cause so that this experience can be utilized for future comparisons.

2. *Introduction of New Procedures*

Tentatively, a few rough tests should be instituted in addition to present determinations including chlorine demand, a modified oxygen consumed test, and a qualitative test for metals, including arsenic.

(a) *Chlorine Demand*—It is recommended that the chlorine demand test be made on all sewage and sewage effluents regularly. Since most war gases in concentrations of 20–30 p.p.m. will produce chlorine demands of 100–200 p.p.m., it is evident that the chlorine demand test modified on this basis is able to pick up minor quantities having significant value.

(b) *Oxygen Consumed Test Modified*—Small quantities of war gases produce high oxygen consumed values and are immediately oxidized. It is suggested that the digestion period be reduced to 5 minutes.

(c) *Heavy Metals and Arsenic by Hydrogen Sulfide Precipitation*—Such a test might include: first, evaporating to dryness 500 ml. of sewage in sulfuric and nitric acid until the solution is practically colorless; and second, the dilution of the residue with water, and finally precipitation of the heavy metals with hydrogen sulfide. If heavy metals are present, there will be variously colored precipitates. A whitish precipitate of sulfur may obscure the yellowish precipitate of arsenic in quantities roughly below 10 p.p.m., but in larger concentrations arsenic is readily noticed.

(d) *Arsenic in Quantities Less Than 10 p.p.m.*—The best tentative arsenic test including inorganic arsenic and organic arsenicals is good to 1 p.p.m. if the original sample is concentrated 10 to 1. To 100 ml. of sample is added 5 ml. of concentrated sulfuric acid and sufficient concentrated nitric and hydrogen peroxide to decolorize. The sample is heated to SO_3 fumes in a Kjeldahl flask. The residue is dissolved in distilled water and reduced with 0.1 gm. of hydrazine sulfate followed by boiling till sulfur dioxide has been completely removed. After cooling, neutralize with sodium carbonate, add 30 ml. of water and 0.2 gm. potassium bromide and 5 ml. of concentrated hydrochloric acid; follow by titration with 0.01N $KBrO_3$ using methyl orange indicator. The titration is to a disappearance of color with continued additions of methyl orange.

This test is a good qualitative procedure and quite accurate quantitatively. For more precise results the Chaney method is preferable.[7]

(e) *Spectrograph*—The spectrograph is the quickest and easiest method to determine the presence of abnormal amounts of all heavy metallic poisons in extremely small amounts. It is also useful in the detection of arsenic but is not sensitive below 1 p.p.m. Spectrographs are now available in forensic labora-

tories in leading police departments, at leading universities, and in a few progressive sanitary laboratories. Such equipment should be used where convenient.

While it is recommended that the present laboratory tests made by the operator should be watched for the variations above indicated and be correlated to possible additions of metallic and war gas poisons, the writer is of the firm opinion that the other tests above mentioned should be adapted for immediate use. This is recommended not only as a preparedness measure but because of the additional value of such information being readily adapted to practical use so far as the disposal of trade wastes into sewers is concerned.

The health officer and sanitary inspector in health departments should at once institute a threefold program:

First—All water departments should be encouraged to adopt recognized methods in the control of sabotage as recommended in this paper which constitutes the recognized practice by leading cities throughout the United States.

Second—It should recommend that water departments, in the event warfare appears imminent, adopt all of the measures reported herein which are designed after the experience in Great Britain and, further, should initiate an active program to install protective devices on all public buildings, hotels, restaurants, food preparation establishments, industrial plants, and in camps where cross-connections are known to exist.

Third—Every health officer and sanitary inspector should be fully aware of all possibilities of poisoning water supplies by the different means enumerated in this paper and make the best use of present tests with the addition of other tests, if necessary, to be able to advise water departments what to do in the event that their water supplies are poisoned. The health officer will find that most water superintendents are ready to comply with the standard practice in the best cities in the United States which is based on that found necessary in Great Britain and closer coöperation should be effected even though war does not appear imminent.

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Facts and Fancies About Food Fats

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AMERICA is entering a new era. At this time when we are engaged in an "all-out" effort for defense, industry is being geared to produce the weapons of destruction at all possible speed; and men are being trained to use these weapons. Such defense preparations for the destruction of human life are necessary, if and when we go to war.

Yet there is another defense program of a more civilized aspect and of longer standing, now receiving more serious national attention—a program which has as its main objective the preservation of life and the improvement of health. I refer to our awakened and united concern for a more adequate diet and a better nutrition for all the people. It is time that we face the facts about foods, spread the truth, the whole truth, and nothing but the truth, and liquidate the mistakes of the past.

Every thoughtful citizen should be concerned with the ignorance prevailing among our people regarding the nature of foods and what is an adequate diet and a good state of nutrition.* He should be concerned with the poverty which prevents millions of our fellow citizens from obtaining an adequate diet, even when knowledge of what constitutes an adequate diet is present. He should also be concerned with the large amount of misinformation as to foods, by direct statements and by innuendo, that is being spread abroad in the land through advertisements. To my way of thinking, food advertisements, local or national, could and should be in the interest of true adult education in the matter of diets and nutrition. The large sum of money annually spent on advertising of foods comes ultimately, like all money, from the producers and the consumers. Should we not, as a people, use this large sum of money as a public trust? Food advertising, as adult education, should be as informative and as accurate as we strive to make other forms of education. It should be made so by the food producers, large and small, rather than by local and federal legislation. The attempt at control of crude and artistic lying by the Federal Trade Commission appears a too cumbersome and inefficient method in a republic of intelligent, informed, and patriotic citizens. I believe that once this situation is called to the attention of our food producers and food distributors, their own sense of public duty will promptly result in voluntary organization on their part leading to elimination of present unseemly practices.

As an example of misleading information in food advertising, we could cite the frequently used term of "health

* "The discrepancy between current popular diets and the type of diet that our present knowledge of foods and nutrition would recommend seems to be due to several factors: food habits, some old, some new; lack of appreciation of the importance of an adequate diet; inadequate knowledge of food needs and food values in relation to cost; inadequate purchasing power; and, in the case of rural families, an inadequate food production program designed to complement food purchases." Hazel K. Stiebling, Food and Life, *U. S. Dept. Agr. Year Book*, 1939, p. 130.

food." As if every food was not a health food for the normal man, woman, or child, if we eliminate the few individuals with special food idiosyncracies. The word "pure" is also frequently so applied in food advertisements as to mislead the uninitiated. For the purposes of human nutrition, every food is pure, when no injurious ingredients have been added in the processes of manufacture, storage, or distribution; when no spoilage or deterioration has taken place; and when no element of dietary importance has been removed from the materials produced by nature. Many troubles due to defective diets started with man's ingenuity in "purifying" and storing foods. We should remember that during the greater part of man's past he has survived and prospered, in the matter of foods and diets, subsisting essentially on the natural unpurified, non-processed foods, and guided in the kind and quantity of diets by the bodily needs as expressed in the natural urges of hunger and appetite.

Our remote ancestors probably ate whatever they could get. And our recent information of the chemistry of foods, and the specific food requirements for health, indicates clearly that there is a large factor of safety in human nutrition by including in our diet both animal and vegetable foods, that is, by being omnivorous. The story of the exclusively vegetable-eating, or herbivorous, and the exclusively meat-eating, or carnivorous animal species goes to prove that all the ingredients in fats necessary for health can be adequately secured either from animals or from plants. From necessity and from choice, man has been omnivorous for a long, long time. As long as only a small percentage of our population is strictly vegetarian, or abstains from foods from particular animal species, on esthetic or religious grounds, this raises no serious problem in national nutrition, although, to a physiologist, it seems very unwise for normal people to avoid such high grade and common foods as meats, eggs, milk, butter, and cheese. Should a majority of our population ever refuse foods of animal origin, we would have to institute human birth control in earnest, liquidate preventive medicine, start eating grass, or pray for death control through pestilence and war, because without the animal conversion of the grasses on the land, and other vegations in lakes and seas there would be shortage of food, even for the present human population on the earth.

Another error fostered by published statements about some foods is that the color of white, or whiteness, in such foods as flour, bread, fats, etc., is an index of purity and superior wholesomeness of these foods. Nothing can be further from the truth, as a general proposition. A few natural foods, and some chemically separated, or processed, food elements may be transparent when in solution and hence be colorless. But practically no natural food is white. And there is no evidence that the natural colors of foods are harmful factors in human digestion and nutrition.

Even more reprehensible misstatements occur in connection with the advertisements of the edible vegetable and animal fats, and food products manufactured through various processings of these fats. For example, vegetable oil shortenings are sometimes described as "creamy smooth," as "triple creamed" which, to the average layman, may suggest cream. Some vegetable oil shortenings are labelled "the digestible shortening" and described as "easy to digest," suggesting to the average layman that other shortenings are not digestible or at least not so easily digested. Still another vegetable oil shortening, besides advertising "purity" and "wholesomeness," conveys the innuendo of unpleasant or unwholesome odors in animal fat shortenings by the statement: "adds no flavor of its own."

The word "pure" is most frequently applied in such a way as to suggest that similar articles of food made from other fats are less pure. The particular sinners here appear to be some of the vegetable fat manufacturers. In advertising these vegetable fat products, the term "containing no animal fat" is frequently so played up as to suggest that similar products made from animal fats are not pure or are less pure, less wholesome, and less digestible. One product offered cash prizes "for the most English words made with the letters in the slogan 'contains no animal fat.'" One vegetable oil shortening advertises "purity" and freedom from "smells" in such a way as to imply that impurity and bad smells adhere to other makes of shortenings. Again, in advertising, the terms "digestible," "pure vegetable," and "energy giving" are associated in such a way as to suggest that vegetable fats are more pure and more digestible and energy giving than are the animal fats. In fact, one of these shortenings is advertised as having "miraculous digestibility"! Another is said to "digest easily," which implies that other shortenings digest less easily.

In this connection I cannot refrain from recording my disapproval of the consequences of the trade fight of the dairy industry on the producers of wholesome margarines, whether these be mainly made from vegetable oils or from vegetable oils and animal fats, for this is a fight on our fellow citizens with the lowest income. The dairy industry can and should stand on its own feet, as it produces some of the finest and most valuable foods for man: milk, butter, and cheese. But, to my way of thinking, it is unpatriotic and short-sighted of this industry to place an additional economic burden on the lowest income group in our nation. For the nutritional welfare of the people in the lowest income group we should not step up the price of the margarines by special taxes. These people would be better off in health by buying and eating two to three pounds of good margarines at about the price of one pound of winter butter. For such a wholesome food as good margarines can be produced and distributed at a lower cost than butter, and can be so fortified with the vitamins normally occurring in butter as to be practically equivalent in nutritive value to butter. What difference does it make to human nutrition whether vitamin A or the pro-vitamins A are added to an animal fat like butter by the physiological processes of digestion, absorption, and milk secretion of the cow or goat, or whether these same vitamins or pro-vitamins, all of them produced by the vegetable kingdom, are added to other animal or vegetable fats by the growing ingenuity and chemical skill of man? In my judgment, this fight and the laws, state and federal, resulting therefrom, are not in the interest of adequate national nutrition and national defense.

Sherman (1937) estimates that one-fourth to one-third of the energy in the American and European diets comes from the fats in the food. Langworthy puts the fat eaten daily by American adults as around 5 oz.—7 oz. of fat per day being the maximum that the average human adult can digest and absorb with ease. But the amount of fat a person can, with comfort, take in daily depends on the individual, on the amount of physical work, and on the rigor of the climate, as in the case of the Eskimos. I have seen Finnish lumberjacks in northern Michigan consume well over a pound of boiled pork at one meal, at least half of it being pure fat, without disturbance of the digestive processes.

An ounce of reflection on the part of every informed adult citizen ought to bring out the fact that some natural fats are present in every natural food

for man, be this food of animal or of vegetable origin, and that during the greater part of man's history there was practically no refinement or purification of foods. So when our forefathers, for a million years or more, consumed fruits, cereals, nuts, raw vegetables, eggs, fish, fowl, or flesh, they consumed at the same time varying amounts of vegetable and animal fats. Thus, without knowing it, as the discovery of the essential fatty acids and the importance of choline is of very recent vintage, man of the past obtained at least the necessary minimum of these food elements.

Fats almost identical in composition, digestibility, and energy value are not necessarily equal in the quantity of vitamins carried by the fats. Practically all natural fats separated from their normal association with the proteins and the starches of the plant or the animal, carry accessory substances giving color, flavor, and odor to these fats. Whether such flavors or odors are pleasant or unpleasant to man depends largely on the intensity of these flavors and odors, as well as on our past dietary habits. For example, the relatively small amount of oil in a boiled, baked, or fried codfish, mackerel, or trout, is to most people not unpleasant either in flavor or odor. But fish oils by themselves may be disagreeable to the same palate and the same nose.

The animal and vegetable fats in foods, and as foods, constitute a special and a huge problem in the food industry, in food economics, and in our daily diet. Per calory the animal and vegetable fats rank, by and large, as one of our least expensive energy foods. At the same time, there is probably greater loss and wastage of fats than is the case with the proteins and the starch of our dietary—loss through rancidity, waste in cooking, and waste at the table. Much of this waste is avoidable, and this avoidable waste is inexcusable in the face of the undernutrition in our own land, not to speak of the starving millions across the seas.

The basis for the above statements of facts and the plea for truth in all statements about food is contained in the following digest of our present scientific information on the chemistry of the fats, and the rôle of the fats in nutrition. This digest is further briefed in a summary of conclusions beginning on page 1189.

1. THE FATS IN THE DIET FURNISH CONCENTRATED ENERGY FOR THE WORK OF THE BODY

The numbers of calories, or energy, obtained on oxidation in the body of the three main classes of foods were reported by Rubner in 1901. A gram of carbohydrate produces 4.1 calories. A gram of protein also yields 4.1 calories. A gram of fat yields from 9.1 to 9.3 calories of heat or energy. The fats are, clearly, the most concentrated foods, from the standpoint of energy.

Another advantage of the fats as a source of energy for the body lies in the fact that the fats have a relatively low specific dynamic action. Specific dynamic action of a food is the percentage of its available energy dissipated, after ingestion, in raising the heat production in an individual, irrespective of body needs, above the level found in the fasting and resting state. According to Lusk, for every 100 calories of protein eaten, the heat production is increased 30 calories above the basal level. For 100 calories of carbohydrate (starch) ingested, the heat production is increased by 4.9 calories, and for every 100 calories of fat, the heat production is increased by 4.1 calories above the basal level. Other figures indicate that the specific dynamic action of fat is more variable, but it is always well below that of protein. But the energy needs of the individual cannot be completely met by the ingestion of fat, since it seems necessary that

some carbohydrate be metabolized at the same time as the fat, in order that the acid metabolites derived from the fats may be nearly completely oxidized.

Carbohydrates, and also part of the protein ingested in excess of current body needs for repair and growth, can be and are converted into fat and stored in this form, so that the body is not entirely dependent on the ingested food fat to form its stores of body fat.

2. THE FATS ARE THE ONLY SOURCE OF THE ESSENTIAL FATTY ACIDS

Certain natural fats serve as the source of essential fatty acids. Fats and oils consist of the tri-hydric alcohol, glycerol, having the formula $C_3H_8O_3$, combined with certain higher fatty acids, such as butyric acid ($C_4H_8O_2$), caprylic acid ($C_8H_{16}O_2$), oleic acid ($C_{18}H_{34}O_2$), or linoleic acid ($C_{18}H_{32}O_2$). The latter two are both unsaturated acids, so-called, because they can take hydrogen at linkages between carbon atoms where there are double bonds. Stearic acid is a saturated fatty acid, $C_{18}H_{36}O_2$, and cannot take up such elements as hydrogen.

Burr and Burr (1929, 1930, 1940) have shown (on rats) that unless small amounts of certain fatty acids are present in the diet, a dietary deficiency disease is produced. The symptoms include scaly and inflamed skin, cessation of growth, kidney disorders as shown by the appearance of blood in the urine, and impairment of reproduction. Finally there is decline in weight, followed by death. The natural fats and oils which were found to prevent or cure this deficiency disease were corn oil, linseed oil, olive oil, and lard. Between 5 and 15 drops of these fats daily, fed to the individual rats, was all that was necessary to cure the deficiency symptoms described above. Butter and coconut oil when fed to the deficient rats in amounts of 15 drops daily per rat permitted but little growth (10 to 20 gm. in 50 days) and did not cure the scaliness of the skin. This apparent deficiency of the essential fatty acids in the milk fat of cows does not seem to square with the absence of the symptoms of such deficiency in infants fed for months almost exclusively on breast milk or cows' milk. Such a diet is known to produce anemia, due to too little iron in the milk. There may be considerable stores of essential fatty acids in the body of the new-born mammal, or the content of essential fatty acids in human milk fat is higher than in cows' milk.

On studying the composition of the natural fats which had these curative effects, it was found that the fats having large amounts of the unsaturated fatty acids, linoleic, linolenic, or arachidonic acids, brought about the greatest improvement in growth and in recovery of the skin, when fed to rats which had developed the deficiency symptoms on a fat free diet. Coconut oil and butter, which (in the amount fed) did not cure the deficiency symptoms, contain little of the three unsaturated fatty acids named above.

The work of Burr and Burr showing the need for certain unsaturated fatty acids in the rat diets has been confirmed and extended by several investigators. Evans and Lepkovsky (1932) showed that the rate of growth of rats fed a diet including butter, lard, or the liquid fats of coconut oil, which contain both saturated and unsaturated fatty acids, was three or four times the rate found in rats fed a diet containing only saturated fatty acid as the fatty material in the diet. Evans, Lepkovsky, and Murphy (1934) also reported that reproduction was not normal in rats unless the essential unsaturated fatty acids were added to the diet. On a diet free or nearly free of fats, degeneration of the testes occurs. Hume and coworkers (1940) found arachidonic acid most important for growth, while linoleic acid

was most significant for the health of the skin.

3. THE FATS APPEAR TO HAVE A SPARING ACTION ON THE B VITAMINS

Birch (1938) studied the interrelation between the essential fatty acids and vitamin B_6 in the nutrition of rats. He found that:

> . . . rats may develop the acrodynia-like dermatitis if the diet is free from fat, even when moderately large amounts of vitamin B_6 are given. . . . Even with 10 times the minimum curative dose (of B_6), unsaturated fatty acid is necessary for normal health and growth. . . . The amount of B_6 ingested by the rat appears to determine the kind of dermatitis which is to develop. When ten minimum doses of vitamin B_6 are fed, the symptoms found are similar to those described by Burr and Burr (1932), (dandruff, loss of hair, sores on skin). When only 2 to 5 times the minimum dose of vitamin B_6 is fed, the acrodynia-like dermatitis appears. These results would indicate that the function of vitamin B_6 and the unsaturated fatty acid factor in the animal body are closely connected.

Birch not only fed diets free of fat, containing varying amounts of vitamin B_6, but he reversed the conditions of the experiments and fed diets free of B_6, containing varying amounts of natural fats, i.e., lard and linseed oil, which are rich in the essential unsaturated fatty acids. Onset of skin symptoms occurred in 3 to 4 weeks, when no fat was fed, in 6 to 7 weeks with 5 per cent lard in the diet, in the 8th to 14th week with 10 per cent lard in the diet. Growth was poor in all cases, since the rats gained only 20 to 30 gm. after being 100 days on the diet containing 20 per cent lard and no vitamin B_6. It may be concluded that the inclusion of lard or linseed oil delayed the onset of the typical dermatitis due to lack of vitamin B_6. When butter was fed as 9 per cent of the diet, instead of lard or linseed oil, the resulting skin symptoms were more severe than with the latter fats. Butter has only small amounts of the essential unsaturated fatty acids. The supplemental action of vitamin B_6 and the essential fatty acids has also been shown by Salmon (1940), who reports that both are needed for normal nutrition.

Fats have been found to have a sparing action on vitamin B_1, and this action is not limited to the essential unsaturated fatty acids. Evans and Lepkovsky (1932) fed three different levels of vitamin B_1 (brewers' yeast) to different groups of rats varying from 50 mg. to 800 mg. daily. At each level of yeast there was better growth with at least 9.7 per cent fat (lard) in the diet, than with a fat free diet. It is possible that the added fat gave added increments of essential unsaturated fatty acids, since these were not provided otherwise in the diet, except as they were found in the 2 drops of cod liver oil fed each rat daily, or as traces in the casein. These authors also present evidence (1934) supporting the view that high levels of vitamin G and protein are necessary for the sparing action of fats on vitamin B_1. Arnold and Elvehjem (1939) found that when the fat content of the diet was increased to 56.5 per cent by *isocaloric* replacement of the sucrose of the initial diet with lard, the thiamine requirement of dogs was decreased to approximately one-third of the former level. The thiamine requirement may best be stated as 75 micrograms of thiamine chloride per 100 gm. of the non-fat constituents of the diet. The authors declare that " the isocaloric substitution of fats for carbohydrate in the diet is a nutritionally sound procedure. Assuming the initial ration is balanced, the balance is necessarily retained even when large amounts of fat are substituted for the carbohydrate in the diet."

4. THE FATS ARE THE CARRIERS OF VITAMINS A AND D

The fat soluble vitamins A and D,

are found in greatest concentration in fish liver oils. McCollum, *et al.* (1939) gives the number of international units of vitamin A per 100 gm. of cod liver oil as 100,000 to 250,000, and of vitamin D, 8,500 to 25,000. Among the natural fats and oils commonly used for cooking and other purposes in our daily diet, summer butter is the richest source of these two vitamins. The vitamin A content of butter ranges from 1,000 to 8,500 I. U. per 100 gm. and the vitamin D content ranges from 40 to 150 I. U. per 100 gm. The vitamin A content of butter varies with the breed of cows and with the season of the year. Booth, *et al.* (1934) found values (biological assay on rats) which varied from 8,500 units per 100 gm. in summer butter to 4,000 units per 100 gm. in winter butter. Bauman, Steenbock, *et al.* (1934) made spectroscopic determinations of carotene and vitamin A content of butter fat from cows of different breeds on high and low carotene diets. On winter rations, butter from Guernsey cows gave 5.1 micrograms of vitamin A per gm., and butter from Holstein cows gave 10.1 $\mu_{gm.}$ of vitamin A per gm. of butter. On fresh green feed rations, the figures for Guernsey and Holstein butter were respectively 8.5 and 15.1 $\mu_{gm.}$ of vitamin A per gm. The individual variations between members of the same breed on the same diet were as great as 100 per cent.

Natural fats and oils, other than fish liver oil and butter have in general smaller amounts of vitamin A and vitamin D. An exception to this is found in the report of Kon and Booth (1934) that samples of American lard contained as much vitamin D activity as samples of summer butter. The reports on vitamin A content of lard are conflicting. Daniels and Loughlin (1920) concluded that if large enough amounts (28 per cent) of lard or cottonseed oil were fed to rats the animals received adequate amounts of these fat soluble growth promoting vitamins. Mallon and Clark (1922) fed rats a similar diet containing 30 per cent lard, with 0.6 gm. yeast, as the daily supplement. The authors concluded that there was not sufficient vitamin A in the lard to prevent severe vitamin A deficiency. On the other hand, Drummond, *et al.* (1920) concluded that there are appreciable amounts of vitamin A in the body fat of pigs fed a high vitamin A diet. They support the view that loss of vitamin A in lard is due, not to the high temperatures of rendering, but to stirring or otherwise oxygenating the lard with resulting oxidation of the vitamin A. The evidence indicates that lard as marketed contains little or no vitamin A but may contain vitamin D equal to that found in butter. The fat of beef has been found to contain some fat soluble vitamins. Fetter and Carlson (1931) reported that, as tested on rats, an oleo oil-lard-milk margarine was equal to butter in vitamin A content and superior to butter in vitamin D content.

McCollum, *et al.* (1939) states that corn oil and cottonseed oil contain no vitamin A. But according to Sherman (1937) yellow vegetable oils, such as olive oil, yellow palm oil, and maize oil, may contain appreciable amounts of this vitamin. Vegetable fats which have been hydrogenated or drastically refined are devoid of vitamin A.

Recent investigations indicate that fats in the diet probably influence the effectiveness of vitamin D in preventing and curing rickets. Jones (1940) showed that addition of 5 per cent to 25 per cent lard to the synthetic rachitogenic diets had definite antirachitic action. The lard increased calcification on diets containing large (1.1 per cent) or moderate (0.38 per cent) amounts of calcium. The effect of the lard was less pronounced on diets very low in phosphorus than on diets higher in phosphorus. The author believed that the fat acted in some manner to increase

calcium and phosphorus absorption, possibly through furnishing a more acid reaction in the intestine.

Insufficient fats in the diet will impair growth and induce serious injuries in the liver and the kidneys, through insufficiency of one of the components of most fats, namely choline. Recent investigations (Best and Ridout) show clearly that, apart from the energy or calory factor, choline is as necessary in the diet as are the essential fatty acids and the fat soluble vitamins A and D.

5. THE SPARING ACTION OF FATS ON PROTEINS

Nitrogen equilibrium is the state in which the amount of protein in the diet equals the amount of protein broken down in the body. It is important for health to protect the body proteins from serious depletion by having the amount of protein in the diet adequate for the requirements of protein metabolism, all the cell protein being destroyed in the body thus being regularly rebuilt from the food proteins. Much less protein is needed in the diet to maintain nitrogen equilibrium when fat or carbohydrate foods are eaten with protein than when the diet is largely protein. This is due, at least in part, to the fact that, when protein is eaten alone, it must supply all of the energy needs of the body as well as furnish the protein needed for growth and repair of body tissues. In the matter of energy the fat in the diet can replace a large part of the starches and proteins in the diet, and during a period of underfeeding or starvation, the body fats are drawn on, and less body protein is destroyed or burned than would be the case if no fat had been stored in the body. As mentioned above, the specific dynamic action of fat is considerably lower than of protein, so that less excess heat is produced when fat in the food, or fat from body stores, is metabolized, with the protein.

6. IN GENERAL, THE NATURAL FATS IN FOODS INCREASE THEIR PALATABILITY

Butter has long been one of the table fats used by many European and American peoples as a flavoring for vegetables, creamed dishes, and desserts. Olive oil has been used by the Italian people to flavor their foods. The flakiness imparted to pie crust and crackers, and the characteristic texture of cakes and cookies, imparted by lard and vegetable shortenings, as well as the flavor imparted by the fat, do much to enhance the palatability of the food containing it. The factor of palatability is of no small importance in insuring an intake of necessary types and amounts of foods. This is illustrated often with children. The palatability of the food can play an important part in insuring that new dishes are enjoyed, or adequate amounts of vegetables are eaten. Enjoyment of food, in turn, promotes good digestion through the enhancement of the flow of digestive juices, and normal digestive motility of the alimentary canal.

The flakiness or crispness imparted to such foods as pie crusts, cookies, and cakes by fats is also spoken of as the "shortening power" of fats. When variations in the baking art of the individual are eliminated the "shortening power" of the different fats may be measured by determining the force required to break the cookie or the pie crust. Using such methods, Fisher (1933) found, on the average, a 25 per cent difference in the shortening power of such food fats as lard and hydrogenated cottonseed oil, lard having the highest and the cottonseed oil the lowest. But this is a culinary problem, not a nutrition problem, except to the extent that flakiness and crispness increase palatability, thus favoring digestion, and may tend to decrease wastage of foods. And variations in the art of baking seem as important as the kind of fats employed for "shortening"

(Lowe, Nelson and Buchannan, 1938).

Fatty foods leave the stomach more slowly than carbohydrates or proteins. In susceptible persons, or after the ingestion of very large amounts of food, this may cause a feeling of increased weight or heaviness. On the other hand, lengthening of the stomach emptying time by the fats in the food may lead to a desirable sense of comfort and satisfaction. The energy requirement may be adequately supplied by carbohydrate and protein, yet since they leave the stomach rapidly, the hunger sensation may return too quickly and lead to over eating.

7. THE COMPARATIVE DIGESTIBILITY OF FATS

U. S. Department of Agriculture *Bulletin 310* presents results on a study of the digestibility of various food fats. "Digestibility" of a fat refers to the amount of the ingested fat which is assimilated. Values were determined from the amount of fat eaten by the subjects and the amount of fat excreted in the feces. The results show that the common dietary fats and oils such as butter, lard, cottonseed oil, hydrogenated cottonseed oil, cream, etc., are about equally well digested, the amount retained by the subjects ranging from 96 per cent to 98 per cent of the fat eaten. Fats of somewhat lower digestibility are mutton fat (88 per cent digested), and oleostearin (80.1 per cent digested). The latter is a hard fat of high melting point found in fat around the beef kidney. The relation between melting point and digestibility of a fat was pointed out in the Department of Agriculture studies, butter, melting at 32.0° C., was 97.0 per cent digested. Lard, melting at 35.0° C. was 97.0 per cent digested, while beef kidney fat, melting at 45° C. was 93.0 per cent digested, and mutton fat, melting at 50.0° C. was 88.0 per cent digested.

Drummond tested the digestibility of lard and lard substitutes and found that neutral lard, hardened cottonseed oil, and lard compounds, with melting points of 40.0° C. or less, each had a coefficient of digestibility of between 96.0 per cent and 98.2 per cent. The experiments of this author, and those previously cited, indicate that the fats and oils which are in common use as foods are all of high and practically equal digestibility, only mutton fat and the stearin of beef kidney fat showing slightly lower digestibility. Most of the animal and vegetable fats are well tolerated by normal adults in amounts ranging from 80 to 150 gm. per day, but the beef kidney fat, goose fat, and olive oil appear to have a laxative effect when eaten in quantities of this magnitude, though they can be eaten with no disturbing results in amounts less than 80 gm. per day.

All the scientific data on the digestibility, flavor and color of the dietary fats show clearly that there is no significant difference in digestibility between animal and vegetable fats, and that the acceptability of these fats in regard to color and flavor is a matter of past conditioning of the individual and of no other significance in nutrition.

SUMMARY OF CONCLUSIONS

1. Natural fats are almost universally distributed in animal and plant materials fit for, and used as, food for man. These animal and vegetable fats, when liquid or nearly liquid at the body temperature of man, are equally digestible and available for the energy needs of the body.

2. The natural fats (animal and vegetable) differ in the amount of vitamins A and D dissolved in these fats. Fish liver fats and summer butter carry the highest concentration of vitamin A of any food fat, unless vitamin A concentrates from other sources have been added. Rancidity, and various manufacturing processes, employing temperatures much above that of the mammalian body and affording increased rate of oxidation, decrease or destroy the vitamin A, natural or added, in fats.

3. A minimum of fats in the diet is necessary for health and life. The known factor

or factors are the essential fatty acids, choline, and vitamins A and D. But, in all probability, this is not the whole story of the indispensable rôle of the fats in human nutrition. While the essential fatty acids are widely distributed, but in varying percentage, in the animal and plant fats, the widest variety of foods are clearly a factor of insurance of safety and health as regards these indispensables. Such processings as hardening (hydrogenation) of the more liquid fats so change the essential fatty acids that, though still useful as a source of energy, they can no longer perform their specific rôle in human life and nutrition.

4. Except to the extent that individuals, through teaching and habit, are conditioned to prefer, or dislike, the specific color, odor, and taste of the natural fats, these elements in the fats have no known significance in nutrition, except that the yellow color in natural fats may be a rough measure of the concentration of the pro-vitamins A.

5. The food fats, be they of animal or plant origin, not immediately used in the energy processes of the body, are altered to the characteristic form of the body fats of the species, and stored in the fat depots as energy in reserve, against days of food scarcity and disease. But adiposity or excessive weight, *per se*, is not an index of excessive fat consumption, as excess starch and excess proteins in the diet also add to stored body fats. We have indications, in rats and men, that both depletion and overabundance of the fat stores of the body, either as a symptom or as an essential link in the life process, are both unfavorable to human health and longevity.

6. The arts of food processing and food refining, food preservation and storage, cooking and baking, have in the past grown, like Topsy, through human ingenuity, driven by real and fancied needs, to satisfy the human palate, the human nose, the human eye, and the pocketbook of the individual, rather than to meet the essential needs of human nutrition. We now have a sufficient body of reliable information on the fundamentals in the nutrition of man to guide these arts by adult education based on facts and reason. To pursue any other course from now on seems unscientific, nationally short-sighted, and a disservice to the most fundamental needs of man. So why not combine all our forces for a steady pull on this oar?

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Staphylococcus Enterotoxin: An Improved Cat Test, Chemical and Immunological Studies

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AN attempt has been made in the studies here reported to evaluate the biological tests recommended for the detection of the presence of staphylococcus enterotoxin and to simplify and standardize the interpretation of the most reliable of these. At present most health department laboratories find it impractical to test for this very common food poisoning substance because of inherent difficulties of the available tests and the almost complete lack of knowledge regarding the chemical nature of the toxin and of how to extract it from suspected foods. When it was felt that the criteria for a reliable, inexpensive, practical and highly specific test had been met, by means of it preliminary studies were made of the physical, chemical, and immunological properties of the toxin.

QUALITATIVE TESTS

Since Dolman, Wilson, and Cockcroft [1] described the intra-abdominal kitten test, other *in vivo* tests have been abandoned to a large degree. Man, although probably the most susceptible of all animals, for obvious reasons is now seldom employed. Monkeys have been extensively used but data have been accumulating which indicate that these animals have relatively low susceptibility, show great variation in their response, and give occasional false positive reactions.[2-5] In our experience monkeys have proved very unsatisfactory and perhaps the greatest single objection lies in the fact that they are not readily available to many laboratories.

Dolman Kitten Test—

The kitten test as described by Dolman and his associates [1] involves the injection of specially prepared culture filtrates into the abdominal cavity of very young kittens (250–500 gm.) after inactivation of the lethal exotoxins by heat, formalin, or neutralization by specific antitoxin. After a variable period of time, toxic filtrates will produce vomiting and diarrhea. These workers indicate that the same kitten may be used repeatedly within limits, and Dolman and Wilson [6] set these limits at 7 to 10 days, explaining that after a period of 2 to 3 weeks a significant degree of immunity may develop. Kupchik,[7] although confirming the usefulness of the test, believes that an animal should be used a second time only after a period of 2 weeks has elapsed. Rigdon [8] and Jones and Lochhead [9] report nonspecific reactions following the inoculation of control materials.

During the early phases of this work

false positive reactions and the rapid resistance gained through previous inoculation presented severe difficulties, but before abandoning the method an experiment was planned to determine if possible the chief factor responsible for the rapidly developed tolerance. It was suspected that peritoneal irritation produced the nonspecific vomiting and diarrhea and, if this could be incriminated as playing a rôle in the development of resistance, the route of inoculation should be abandoned, but not necessarily the animal.

A group of 7 previously unused kittens all weighing about 1,000 gm. were inoculated intra-abdominally at intervals of 2 days with various materials in equal amounts by weight; these were: known enterotoxic filtrate,* filtrate from known nonenterotoxigenic strains of staphylococci * identically prepared, uninoculated sterile infusion broth similar to that used for toxin preparation, and infusion broth containing 0.3 per cent formalin (Table 1). All cats were tested at the end of the experiment (fourth inoculation for most animals) with the enterotoxic filtrate, together with 2 new control animals. Vomiting accompanied by diarrhea occurred 3 times and nausea and diarrhea once from the inoculation of nonenterotoxin containing material. The various control materials given to 5 kittens on repeated inoculation produced almost the same degree of tolerance to the final test dose of enterotoxin as did repeated inoculations of enterotoxin to 2 kittens receiving this material only, and the

TABLE 1

Results of Multiple Intra-abdominal Inoculations of Enterotoxin and Nonenterotoxic Materials in Equal Doses, at Regular Intervals, in Previously Unused Kittens

Days between Inoculations		—		2		2		2		10	
Cat No.	*Weight in Grams*	*Inoculum*	*Reaction*	*Inoculum*	*Reaction*	*Inoculum*	*Reaction*	*Inoculum*	*Reaction*	*Inoculum*	*Reaction*
1	1,000	C.P.[1]	+++	C.P.	0	C.P.	±	C.P.	0	C.P.	0
2	1,050	C.P.	++++	C.P.	+	C.P.	+	C.P.	0	C.P.	+
3	900	Broth	0	Broth	0	Broth	0	C.P.	0	C.P.	+
4	1,400	Formalin broth[2]	0	Formalin broth	+*	Formalin broth	0	C.P.	+	—	—
5	800	W-46[3]	+++	43[4]	±	W-46	0	C.P.	+	—	—
6	1,200	—	—	Autolysate C.P. organisms	0	Formalin broth	+*	C.P.	++	—	—
7	1,250	—	—	W-46	0	43	0	C.P.	++++	—	—
8	1,200	—	—	—	—	—	—	C.P.	+++	—	—
9	1,200	—	—	—	—	—	—	C.P.	++++	—	—

[1] C.P. = Enterotoxigenic strain. [2] Formalin broth = 0.3 per cent formalin in infusion broth.
[3] W-46 = "Wood" strain, nonenterotoxigenic. [4] 43 = Nonenterotoxigenic strain.
* Vomiting occurred less than 15 minutes after inoculation.

degree of tolerance in all varied in direct proportion to the number of previous inoculations, regardless of the materials employed. Three of the animals were again inoculated (fifth inoculation) after a 10 day rest period, and 2 which previously failed to react again responded in a positive manner. We conclude from this that peritoneal irritation resulting from the inoculation

* Staphylococci used in this experiment and others here reported were obtained from the following sources:

W-46, nonenterotoxigenic Wood strain obtained from Dr. Dolman.

43, nonenterotoxigenic strain isolated from the Bundaberg disaster, obtained from Dr. Dack.

C.P.; C.C.P.; W.C.; and C.E. isolated by the author from cream filled pastries sent to this laboratory by the Massachusetts State Department of Public Health. These pastries were incriminated in four separate outbreaks of food poisoning. All four strains are yellow pigmented staphylococci and produce high titers of enterotoxin, with varying amounts of *alpha* and *beta* hemolysins.

of even sterile culture medium results in slower or less complete absorption of subsequently inoculated toxic materials. After a prolonged rest period this low grade peritonitis clears and normal absorption may again occur. It was not possible to determine through this experiment whether or not specific immunity results from repeated inoculations of enterotoxin, for the nonspecific peritonitis masked the other possible effects.

Intravenous Kitten Test—

Davison, Dack, and Cary [10, 11] have used the intravenous and intracardiac routes for inoculating cats. In our experience, which includes over 175 intravenous inoculations of toxic material, this route provides the method of choice. We have been pleased to find that not only were nearly mature or adult cats more easily handled and inoculated, more easily obtained, and less susceptible to epizoötic disease, but they were also more susceptible to toxins inoculated by the intravenous route than are the tiny kittens employed by Dolman and his associates. For all practical purposes the same amount of toxin can be expected to produce a similar response in any animal ranging from about 800 gm. to the largest cat.

To perform the test, the cat, without anesthesia, should be placed on its back on an animal board and the inner aspect of one thigh shaved to a point just below the knee. Slight pressure over the vein near the inguinal region enables one easily to see and enter the saphenous vein at about the level of the knee, or just above, with a sharp 26 gauge needle. After releasing the pressure above, the syringe and leg should be grasped together with one hand and the injection made slowly. Depending on the toxin, from 0.5 ml. to 5 ml. may be required. The toxin must of course be first treated to inactivate the lethal factor or factors. This we find most convenient to do by heating a small amount for 30 minutes in a boiling water bath. The precipitate should be sedimented and the supernate used as inoculum. When heat is used, the supernate from well centrifuged cultures may be safely used without filtration. Sterility, in practice, appears to be unnecessary. So far, although 49 inoculations of many different materials which did not contain enterotoxin have been made by this route, some of them in doses up to 12 ml., no nonspecific vomiting has occurred.* Only one cat has died as a result of inoculation of either toxic or nontoxic materials and this was due to an immediate anaphylactic-like reaction after rapid inoculation of a large dose of enterotoxin in a cat which had received many previous inoculations.

After repeated inoculation tolerance develops, but this occurs to a much less degree than when the intra-abdominal route is used. No single experiment has been planned to demonstrate the degree of resistance developed, but an analysis of the protocols of individual animals is productive of information in this regard. We have never found any cat which failed to vomit on first intravenous inoculation with a reasonable dose of enterotoxin. Great individual differences occur, however, in apparent degree of tolerance acquired and its rapidity of development. A dosage of 2.0 ml. of toxin of average potency will produce a severe reaction on first inoculation. A somewhat less severe reaction will usually occur on repeating this dose, apparently regardless of the time interval following the previous inoculation. An increase of 50 per cent to 100

* Since submitting this paper for publication, aqueous extracts of fish, after dialysis, have produced nausea and vomiting in cats. This work was done at the George Williams Hooper Foundation, University of California, with Mr. C. W. Lang and associates.

per cent in dosage for the third inoculation gives a moderate or severe reaction. At the next a further increase in dosage is frequently required. Because of the uncertainty of response and the increased volume of inoculum necessary, we seldom use an animal the fourth time, and never accept as final the results of a negative test unless repeated on at least 2 previously unused animals in a minimal dose of 3 ml.

The following experiment demonstrates that the acquired tolerance is not lost, at least in entirety, during a period of rest. Six cats (see Table 2) which had been inoculated with enterotoxin from 1 to 10 times previously, were given a complete rest for 2 months, then all were retested with a 3 ml. dose of a potent toxin. The results are similar to those which might have been expected had no rest period been allowed.

TABLE 2

Effect of a 3.0 Ml. Intravenous Test Dose of Enterotoxin on Cats with Varied Experience After a 60 Day Rest Period

Cat	Number Previous Inoculations	Time in Minutes Nausea Noted	Time in Minutes Vomiting Occurred	Degree of Diarrhea
1	1	39	40	++++
2	2	38	40	+
3	2	55	58	+
4	6	63	—	0
5	7	55	—	0
6	10	—	—	0

The train of symptoms observed after an intravenous inoculation of enterotoxin differs little from that described by Dolman, Wilson, and Cockcroft [1] following intra-abdominal inoculation. In from 15 minutes to 2 hours, most frequently in about 30 minutes, vomiting occurs, preceded by nausea. Coarse tremors are usually noted and the hair stands erect. This we interpret as a chill or rigor for we have found that the temperature soon begins to rise, usually to 104° F. or 106° F., attaining this maximum only after 2 to 4 hours. This rise in temperature after a chill also occurs following intra-abdominal inoculations, but we are not aware that it has been previously described. Diarrhea, although it occurs in most animals and is frequently very conspicuous, may occasionally be of a very mild nature. When present it usually persists for several hours. Vomiting may recur at intervals of from 5 minutes to 1 hour over a period of 2 or 3 hours. After 3 to 4 hours from the onset of symptoms, the cat is frequently noticeably less ill and 24 to 48 hours later it appears normal if opportunity has been afforded for rehydration. Not infrequently animals develop diarrhea following inoculation of control materials, so vomiting only can be accepted as specific. Since vomiting and occasionally diarrhea are conspicuous symptoms of a very common and highly infectious type of feline epizoötic, panleucopenia (encountered and studied by Hammon and Enders [12, 13] concurrently and independently with Lawrence and Syverton,[14, 15]) it is quite important that the cats used be known to be in good health. Enders and Hammon [16] have described a satisfactory method of actively or passively immunizing experimental animals. A moderate size meal eaten shortly before the inoculation of enterotoxin has been found to increase the effectiveness of the vomiting stimulus, and noted refusal of the offered meal aids distinctly in the elimination of sick animals.

Use of Chick Embryos—

Very careful tests were repeatedly made to determine whether inoculation of developing chick embryos might serve as a method of detecting the presence of enterotoxin. Inoculations were made onto the surface of the chorio-allantoic membrane through an artificial air space, also directly into the yoke sac, but without any apparent effect upon the life of the embryo.

CHEMICAL AND PHYSICAL STUDIES

Using the intravenous cat test which had been found to be highly specific for culture toxins (after inactivation of other toxic factors and observing the criteria mentioned above, *i.e.*, interpreting only as positive those materials which produced definite vomiting and accepting for negative those materials which in doses of at least 3 ml. failed to produce vomiting in at least 2 previously unused animals), we undertook a study of the chemical and physical properties of the food poisoning toxin. As a preliminary step to chemical fractionation, with Dr. Favorite [17] we developed a simplified medium and method for producing highly potent enterotoxin. This medium is extremely simple and contains only dialyzable substances; acid casein hydrolysate, glucose, vitamin B_1 and nicotinic acid, none of which substances are antigenic or give a positive Biuret reaction. No agar was found necessary, thus eliminating another substance which we found to be antigenic when inoculated in rabbits. Except where otherwise stated this medium was used in all the experiments described below.

Dialysis Experiments—

Jordan and Burrows [18] and Minett [4] reported enterotoxin to be dialyzable. We have confirmed this repeatedly, using cellophane membranes and sacs, but noticeable losses occurred at some point during the procedure. However, at no time were we able to detect any enterotoxin in the dialysates, even after applying hydrostatic pressure to the bag contents and concentrating the test material by evaporation. Evidence is conclusive, we consider, regarding the large size of the toxin molecule.

Heat Stability—

It has been repeatedly demonstrated by many workers as well as ourselves that this toxin is able to withstand a temperature of 100° C. for 20 to 30 minutes with very little loss in activity.[2, 3, 5, 19]

Effect of Acid and Alkali—

Although Jordan [18] and Borthwick [20] report to the contrary (the tests which they employed cannot be accepted as reliable or specific in the light of present knowledge), Minnett [4] found enterotoxin resistant to HCl at a pH of 5.0. *In vivo*, since man is susceptible to this toxin taken by mouth, it would seem probable that it would be resistant to an even lower pH, similar to that found in the stomach. Using acetic acid to lower the pH of a culture toxin to pH 4.5 we found the toxin to be present and active in the supernate after incubation for 24 hours at 37° C. Similar treatment with NaOH at a pH of 8.0 to 8.2 appeared to have no deleterious effect.

Effect of Enzymes—

Although Minett [4] reports that a *formalinized* filtrate containing enterotoxin was inactivated by trypsin in 4 hours at 37° C. we have twice found *crude* toxins to be unaffected by this enzyme. The toxin was placed in a dialyzing membrane with 2 per cent trypsin and the reaction adjusted to pH 8.0 and this in turn suspended in a buffer solution of pH 8.0. After 48 hours' incubation at 37° C. the other toxic factors had been entirely destroyed but the material produced vomiting in

all of 4 cats inoculated by the intravenous route. Three new cats inoculated with 3 to 3.8 ml. of culture medium which had been subjected to an identical digestion with trypsin showed no reaction following inoculation.

In a similar manner to that used for the digestion with trypsin, 2 per cent pepsin in a pH of 4.3 was permitted to act for a period of 24 hours at 37° C. A control of uninoculated culture medium was similarly digested. Tests for hemolysins to rabbit cells showed these to have been completely destroyed by the digestion, but intravenous cat tests indicated that pepsin failed to digest the enterotoxin.

Effect of Fat Solvents—

Davison and Dack [11] found enterotoxin insoluble in chloroform, although Jordan and Burrows [18] reported solubility in both chloroform and ether. We were unable to find any active enterotoxin in ether extracts, but found it in the residual extracted culture filtrate. Davison and Dack [11] report that they found enterotoxin to be insoluble in alcohol, and that it was occasionally precipitated in 50 per cent and in 76 per cent alcohol. They, however, were unable consistently to duplicate their results. We have been able repeatedly to precipitate enterotoxin with ethyl alcohol, both from crude casein hydrolysate toxin and from infusion broth toxins. In experiments where the toxin had been first dialyzed, 0.8 per cent NaCl was added as an electrolyte; otherwise no adjustment was made of electrolyte or of pH. In all instances two volumes of 95 per cent ethyl alcohol were added to one volume of toxin. This was stored at 2° C. for from 24 to 48 hours and the sediment collected by centrifugation and redissolved in normal saline.

Precipitation by Ammonium Sulfate—

Davison and Dack [11] report consistent results with ammonium sulfate treatment of toxic material. In their hands, 50 per cent saturation failed to precipitate enterotoxin, while complete saturation did so effectively. Previously, in attempting to separate various hemolysins by fractional precipitation with ammonium sulfate, we had found that practically all detectable *alpha* and *beta* hemolysins were precipitated by 65 per cent saturation. When 75 per cent saturation was employed with enterotoxic filtrates all other toxins were precipitated but enterotoxin was found to remain in solution. Sterile medium and cultures of nonenterotoxigenic staphylococci treated in a similar manner invariably failed to produce vomiting in cats.

Purification of Toxin by Combined Ammonium Sulfate and Alcohol Treatment—

A combination of the two previous procedures was next employed, precipitating out the known antigenic hemolytic and dermonecrotic substance with ammonium sulfate, then precipitating the enterotoxin from the dialyzed supernate by means of alcohol. This procedure was carried out twice with toxins prepared from the "C.E." strain (originally very low in hemolytic titer) in casein hydrolysate medium and as a control repeated on a toxin from strain "W-46" (nonenterotoxigenic). The final precipitate in each case was redissolved in a volume of distilled water equal to about 40 per cent of the volume of the original toxin. For inoculation 0.8 per cent NaCl was added. Although considerable loss occurred, a reasonable titer of toxin was found in each preparation originally containing enterotoxin (2.0 ml. to 6.5 ml. produced vomiting) and the control material produced no reaction.

The second preparation with the enterotoxigenic strain was subjected to certain quantitative and qualitative

chemical tests. The total solids were found to be 1.8 mg. per ml. A micro-Kjeldahl done in duplicate on 1 ml. of the final solution showed no detectable nitrogen. From the appearance of the acid digested residue, considerable carbonaceous material was obviously present. The Biuret test was entirely negative and the Molisch test was positive. After hydrolysis for 1 hour at 100° C. in the presence of 1.5 per cent HCl, a Folin-Wu quantitative blood sugar test was made which indicated the presence of reducing substance equal to about 0.1 mg. of glucose per 1 ml. of solution. The final solution from the first material prepared gave similar results with the Biuret and the Molisch tests. The control material from the nonenterotoxigenic strain gave an extremely small amount of precipitate on treatment with alcohol and the total solids in the final solution were found to be only 0.45 mg. per cent. The micro-Kjeldahl and the Biuret reaction employed on the active material, under the conditions of the test, would be expected to indicate the presence of protein had it represented 10 per cent of the solid material present, but very likely would not have detected smaller quantities.

Immunological Studies—

Although much has been written regarding the immunological aspects of enterotoxin,[1, 4, 6, 10, 21, 22] there is little in the way of convincing evidence for its antigenicity. Tolerance and immunity may be very easily confused, and it is possible that much that has been interpreted as immunity may have been partly or entirely due to some form of tolerance. It is possible that many so called "neutralization tests" could not be properly evaluated because of the imperfections of the test method, pit falls in interpretation, or poor suitability of the test animal.

We have as yet made no immunological test with the partially purified toxin by the ammonium sulfate-alcohol procedure, but repeated attempts with crude toxins to demonstrate specific agglutination, precipitation and *in vivo* neutralization through the use of "hyperimmune" sera from cats and rabbits failed to demonstrate any definite antigenic properties. With the possibility in mind that enterotoxin might be antigenic through a haptene linkage, and on finding that attempts to separate the enterotoxin from trypsin, after tryptic digestion, by heat and by acid precipitation were unavailing, this material containing trypsin was used to immunize a rabbit. Serum from this rabbit failed to show any precipitation or agglutination with enterotoxic material not containing trypsin, although a high titer antitrypsin serum was obtained.

DISCUSSION AND CONCLUSIONS

It would appear from the results of this study that the intravenous cat test for enterotoxin is one which can be readily applied to heat treated culture filtrates in any health department laboratory. Since adult cats or large kittens can be used, no difficulty should be encountered in acquiring and keeping the necessary animals, and each may be used three or four times before developing too great a tolerance. Negative results, however, should be confirmed by inoculation of at least two previously unused animals. A healthy cat, given a meal shortly before inoculation, should react by actually vomiting before any test is considered positive. This method of inoculation has definite advantages over the intra-abdominal route.

By use of the above test for detecting the presence of enterotoxin, certain chemical and physical studies have been made possible. The large size of the enterotoxin molecule has been confirmed. Unlike most proteins it is rela-

tively heat stable, and we have demonstrated that it is resistant to both trypsin and pepsin. Evidence from our work suggests strongly that it is nonantigenic. It is precipitated under certain conditions by alcohol and by high concentrations of ammonium sulfate, but not in a 75 per cent saturated solution of the latter. Unlike fats, it is not soluble in chloroform, ether, or alcohol. Small amounts of material originally prepared in a simple, protein-free medium, and which had undergone considerable purification by fractionation with ammonum sulfate and alcohol, were shown to be active yet, in the concentration used for inoculation, contained no detectable nitrogen by the micro-Kjeldahl method and contained a reducing carbohydrate substance. It seems probable from this evidence that the active substance is in the form of a large, complex carbohydrate molecule, and is not a protein.

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Studies in the Epidemiology of Primary and Secondary Syphilis in New York City

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ALTHOUGH contact studies have long been an accepted means of case finding in the majority of infectious diseases, workers in the field of syphilis control have been slow to adopt this method of approach. Wheeler [1] reviewed briefly the status of the epidemiology of syphilis in 1937. Among the outstanding early studies are those of Leland, Nelson, and Gorman [2] who found and examined 74 per cent of the sources of their cases of infectious syphilis and 58.5 per cent of the contacts. Munson [3] by his technic of "sole-leather epidemiology" showed the possibilities of contact investigations in epidemics in small communities. Brumfield and Smith [4] proved the practicability of such studies in Charlottsville, Va. Ingram [5] in 1936 reported epidemiological studies on 200 cases of infectious syphilis with special reference to the social service methods used. These cases named 174 contacts, of whom 73.5 per cent were examined. In 1938, Clark and Sargent [6] reported epidemiological studies on 488 cases of early syphilis in the Health Department clinics of Buffalo, N. Y. They were able to establish and locate the source of infection in approximately 14 per cent of their cases. For every 9 initial cases investigated, 1 hitherto unknown case was placed under treatment. These authors were skeptical of the efficacy of epidemiological studies in syphilis control. Turner, Gelperin, and Enright [7] in 1939, made a careful epidemiological investigation of 247 patients with primary and secondary syphilis admitted to the syphilis division of the medical clinic of the Johns Hopkins Hospital. Contact investigation succeeded in bringing under treatment 114 previously unrecognized cases of syphilis, two-thirds of which were potentially infectious. This is a ratio of 46 contact cases to 100 original cases. Clark,[8] in 1940, has reported the results of two years' epidemiological studies on 824 cases of syphilis admitted to the syphilis clinic of Vanderbilt University Hospital at Nashville, Tenn. Of these cases, 204 had primary or secondary syphilis. They named 387 sexual contacts, of whom 88.7 per cent were examined. Of this latter group, 75 per cent had syphilis. Investigation of these contacts led to the discovery of 213 persons with infectious syphilis, a ratio of 104 to each 100 original patients.

These studies from the leading syphilis clinics of the country prove the awakening of an interest in this

* Aided by the Milbank Memorial Fund, the Barbara Henry Research Fund, Mr. Vincent Astor and the Department of Health of the City of New York.

long neglected aspect of syphilis control.

Early in 1937, shortly after the organization of the syphilis clinic of the New York Hospital, plans were made in an attempt to determine what could be done in the way of contact studies in early syphilis in such a clinic in New York City. The New York Hospital is a voluntary hospital, without official connection with the Department of Health of the City of New York. The organization of this clinic has been previously described.[9] Because of its shifting population and its great area, this city presents problems in any form of epidemiological study which do not exist in rural communities or small cities.

Material on Which Epidemiological Studies Are Based

The present study comprises cases of infectious syphilis (primary and secondary) admitted to the clinic during the years 1937, 1938, 1939, and 1940. These cases came from a variety of sources. Because of the facilities at the New York Hospital for the isolation of cases of infectious syphilis, some of them were referred by the clinics of the Department of Health of New York City for hospitalization. Other cases came voluntarily to the clinic, seeking admission, while still others were referred by the various departments in the hospital. The cases represented a wide range of occupational and social status. Some were of the so-called "white collar" group, while others were definite derelicts.

During the middle two years of the study there was an increase in the ratio of colored to white cases due to the fact that many of the white male cases were being hospitalized elsewhere for another study. This also accounts for the high percentage of females. These cases were unselected and represent all the cases of infectious syphilis registered in the clinic during the four years of the study. They resided in a wide area comprising New York City and its environs.

Table 1 shows the distribution of these 269 cases of primary and secondary syphilis as to sex and race.

Table 1

Cases of Infectious Syphilis

(Distributed as to Race and Sex)

	Number	*Per cent*
White		
Male	91	33.8
Female	60	22.3
Negro		
Male	40	14.9
Female	78	29.0
Total	269	
Sex Total		
Male	131	48.7
Female	138	51.3
Race Total		
White	151	56.1
Negro	118	43.9

Methods

These studies have been carried out under the direction of the Assistant Professor of Medicine in charge of the Syphilis Clinic. The various clinic or resident staff physicians worked in close collaboration with a public health nurse in obtaining information in regard to contacts. The field work was done almost entirely by one public health nurse who had had previous training in syphilis control work. Thus the material contained in the present study represents the routine work of the clinic staff, rather than a special epidemiological study undertaken by experts in that field.

The majority of the patients comprising the present study were hospitalized in the New York Hospital for from 1 to 2 weeks during and following their period of infectiousness. This period of hospitalization would appear to be an important factor in the

naming and finding of both sources of infection and contacts. The public health nurse visits the patients daily during this period. Confidence is thus established and additional contacts are named or more information is given. Further, the visitors who come to see these patients during their stay in hospital provide many of the sources and contacts. Preliminary questioning as to the source of infection and the members of the family and other individuals exposed is carried out by the physician at the time the medical history is taken. With this information as a beginning, the public health nurse prepares a brief case study. This is used as a basis for further social or epidemiological work. As the contacts are named, they are listed as such on a special contact sheet in the patient's history. When these cases are brought in for examination, they are given complete physical examinations, including blood Wassermann and dark-field examination of all suspicious lesions. Even though no evidence of syphilis is found, they are followed until a period of 3 months has elapsed from the time of exposure.

When a contact was found to have infectious syphilis, an attempt was made to identify and examine his own contacts. These infected contacts were not counted as original cases, but have been designated " contacts of contacts."

No special technic has been used in obtaining the information regarding contacts from the patient. Every attempt was made to elicit his confidence and coöperation. The identity of the patient who had given the name of a non-marital sexual contact was not revealed unless the full circumstances of the patient's illness and hospitalization were already known to this contact. The contact cases had always the opportunity of consulting their private physician if they so desired. If the examinations were done by an outside physician, his reports were recorded on the contact sheets. If the contacts or sources of infection resided in another city, all available data were sent to the health officer of that area with a request that he furnish us with a copy of the results of his investigations.

Considerable controversy appears to exist among students of the epidemiology of syphilis as to whether or not actual sources of infection can be identified as such. With full realization of the uncertainty of such a designation, an attempt has been made in the present study to determine " probable sources of infection." For purposes of this study, an individual was regarded as a probable source of infection when he or she, after having been named as a source by another person, was found to have early syphilis—in a stage which made it possible for him or her to have been the source of infection for the individual concerned.

MATERIAL

During the four years of the study 269 cases of primary or secondary syphilis were admitted to the clinic. They were almost equally divided as to sex (Table 1). Fifty-six per cent were white and 44 per cent were Negroes. The contact cases and their contacts are separated from the original patients in the tables and discussion in this study. Cases of latent syphilis discovered through contact investigation are not included in the present presentation.

RESULTS

The results of the contact investigation are shown in Table 2. The 269 cases of infectious syphilis named 663 contacts. A contact was considered as named if enough information was given to make an investigation seem justifiable. In some cases exact names and addresses were available. In others, only descriptions and probable " hang-

TABLE 2

Contacts of Cases of Infectious Syphilis, 1937–1940

	White				Negro				Total	
	Male		Female		Male		Female			
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
Original patients with infectious syphilis	91	33.8	60	22.3	40	14.9	78	29.0	269	100
Contacts named by original cases	151	....	158	....	192	....	162	....	663	....
Contacts of original cases found and examined	125	82.8	134	84.8	139	72.4	143	88.3	541	81.7
Contacts found to have infectious syphilis	42	33.6*	28	20.9*	63	45.3*	39	27.2*	172	31.8*
Contacts named by contacts	31	....	20	....	31	....	29	....	111	....
Contacts of contacts found and examined	31	100.0	19	95.0	28	90.3	28	96.5	106	95.5
Contacts found to have infectious syphilis	17	54.8*	7	36.8*	16	57.5*	12	42.8*	52	47.0*
Number of infectious cases found per 100 original cases	64.8	....	58.3	....	197.5	....	65.4	....	83.3	....

* Of number examined

outs" were known. An average of 2.46 contacts per case were named.

Of the contacts named, the greatest number were colored males. However, this group yielded the lowest percentage (72.4 per cent) of cases which could be located and examined. This would appear to be due to the lack of definite information which could be obtained about the individuals of this group. The ratio of contacts found and examined to those named was remarkably constant in the white males and females and the colored females; being 82.8, 84.8, and 88.3 per cent respectively. An average of 81.7 per cent of all contacts named was found and examined. The majority of these contacts were examined in the Syphilis Clinic of the New York Hospital. In a few cases (less than 5 per cent) these examinations were done by private physicians or coöperating health agencies in other cities. Only when the reports from these outside agencies were definite and clear-cut, was the information included in our record.

Reference to Table 2 will show that 31.8 per cent of all contacts examined were found to have infectious syphilis. Cases of late syphilis discovered in this group were not included in this study. As might be expected from previous reports, the highest percentage of contacts found to have primary or secondary syphilis occurred in the colored male group (45.3 per cent). This is in spite of the fact that a smaller percentage of named contacts was located in that group. The lowest percentage of infected cases (20.9 per cent) was in the white female group.

As the contact cases were brought under observation, they in turn were questioned as to individuals exposed by them. Because of the time necessary for the disease to develop, many of these contacts of contacts were under observation before any clinical or laboratory evidence of syphilis had manifested itself. Sometimes signs became apparent only after several examinations of the syphilis suspect. This element of time could account for the high percentage of contacts of contacts found and examined (95.5 per cent) and for the higher percentage of those examined contacts shown to have infectious syphilis (47.0 per cent). Many other factors enter into the fact that apparently contact investigation is more successful in the so-called "contacts of contacts" than in the original contacts. Important among these is the establishment of confidence in the hospital among the group of patients concerned. Because of the time which of necessity has elapsed, this is more firmly grounded

than during the investigation of the original contact.

It has become customary to express the results of syphilis contact investigation in terms of new cases found for every 100 original cases. In the present study 83.3 new cases of infectious syphilis were discovered as a direct result of contact investigation of every 100 original patients. Cases of late syphilis uncovered by the investigation are not included here. This figure is obtained by adding the 172 cases of infectious syphilis discovered among the contacts and the 52 cases found among the contacts of contacts. Thus, the investigation of the contacts of 269 original cases, yielded 224 new cases of infectious syphilis (83.3 per 100 original cases). The greatest yield occurred among the colored males (197.5 new cases per 100 original cases). Least productive of results were the white females (58.3 new cases per 100 original ones).

Distinction has been made between familial and non-familial contacts. Individuals residing in the household of the patient are considered familial. The non-familial contact group is comprised almost entirely of sexual contacts who are not members of the patient's immediate family. Tables 3 and 4 show the distribution of the contacts and subcontacts made in this way. It would appear that contact investigation was most productive of results in the non-familial group since 64.2 per cent of the infected cases were found among this group. The non-familial males had twice as many infected cases as the non-familial females.

TABLE 3

Contacts of Cases of Infectious Syphilis

(Distributed as Familial or Non-Familial)

	White								*Negro*								
	Male				*Female*				*Male*				*Female*				
	Fam.		*Non-Fam.*		*Fam.*		*Non-Fam.*		*Fam.*		*Non-Fam.*		*Fam.*		*Non-Fam.*		
Contacts	*No.*	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*Total No.*
Named by original cases	67	10	84	13	99	15	59	9	63	10	129	19	102	15	60	9	663
Found and examined	65	12	60	11	97	18	37	7	62	11	77	14	101	19	42	8	541
Found to have infectious syphilis	15	9	27	15	13	7	15	9	17	10	46	27	15	9	24	14	172
Named by contacts	12	11	19	17	15	14	5	4	20	18	11	10	19	17	10	9	111
Found and examined	12	11	19	18	15	14	4	4	18	17	10	9	19	18	9	9	106
Found to have infectious syphilis	3	6	14	27	3	6	4	8	8	15	8	15	6	11	6	11	52

TABLE 4

Summary of Contacts Found to Have Infectious Syphilis

(Distributed as to Familial or Non-Familial)

	Familial		*Non-Familial*	
	Number	*Per cent*	*Number*	*Per cent*
Contacts	60	26.8	112	50.0
Contacts of Contacts	20	9.0	32	14.2
Total	80	35.8	144	64.2
Sex Distribution				
Male	43	19.2	93	42.4
Female	37	16.5	49	21.9
Race Distribution				
White	34	15.0	60	26.8
Negro	46	20.5	84	37.5

PROBABLE SOURCES OF INFECTION

Although it is well recognized that sources of infection in syphilis are much less apt to be capable of accurate determination than in other infectious diseases, it was thought to be worth the effort in the present study to attempt to differentiate the probable source from the other contacts. Elsewhere in this report these so-called sources are considered as contacts. The following criteria were set up for the designation of a case as a source of infection. The individual concerned must have been found to have syphilis, in a stage compatible with the time element concerned. This, together with the history of exposure by the contact would seem adequate evidence to consider the person a *probable* source of infection for the contact concerned.

It is realized that the opportunity for error is great. The following data on probable sources of infection are presented, therefore, at their face value only. In the case of professional prostitutes, it would seem to be important to expend special effort to locate and bring them under treatment if they are named as "sources."

In the present study, 170 (63.2 per cent) of the 269 original cases named a probable source of infection which met the requirements mentioned above. Of these, 99, or 58.2 per cent, were found to have infectious or early latent syphilis.

The high percentage of Negro females (96.1 per cent) naming the probable source of infection is due to an "epidemic" which occurred in a high school and which was traceable to one individual.

COST OF CONTACT INVESTIGATION

Turner and his coworkers [7] have estimated that the cost of contact studies per infectious case brought under treatment was about $18 at the Johns Hopkins Hospital. As they have pointed out, an exact cost accounting is extremely difficult since it would necessitate an estimate of the time expended in this work by physicians. However, in the present study practically all of the field work was done by one public health nurse. Since this represents the major item of expense, the cost of the field work, plus the time of this nurse spent in clinic interviews, may be considered the cost of the contact studies. In this instance, it is estimated that the nurse spent one-half of her time carrying out contact investigations. On this basis, the cost of four years' study was $4,000. This includes the field expenses of the worker. As a result of this expenditure, 224 infectious cases were discovered. The average cost per case was accordingly approximately $18. This is identical with the figure arrived at by Turner and his associates.

DISCUSSION

The wide variation in the results of contact investigation of infectious syph-

TABLE 5

Probable Sources of Infection

	White				Negro				Total	
	Male		Female		Male		Female			
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
Number of original cases	91	33.8	60	22.3	40	14.9	78	29.0	269	100
Probable source of infection known	27	29.7	44	73.3	25	62.5	75†	96.1†	170	63.2
Probable source of infection found and brought under treatment	14	51.9*	28	63.6*	14	56.0*	43	57.3*	98	58.2*

* Of known sources
† See text

ilis, as previously reported by the various workers in the field would appear to leave considerable doubt as to the practical value of such investigations as a means of syphilis control. The present study would seem to indicate that such an investigation can be carried out as a routine measure by the regular staff of a syphilis clinic without undue expense. The fact that these studies were made by individuals without special epidemiological training would seem to be important in that it indicates that contact investigation is within the realm of the small clinic without such specially trained people. Unquestionably the results of the present study would have been better had such expert assistance been available. The fact that one individual physician established the diagnosis, was responsible for the clinical care, and directed the contact investigation of the patient may be a factor in the results obtained, since, in this way a better than usual patient-physician relationship was established.

The importance of beginning the contact investigation in infectious syphilis as soon as the diagnosis is established in the original case is apparent as a matter of common sense. The value of this is directly demonstrated in Table 2 in the high percentage of contacts of contacts (95.5) found and examined. Such cases were, in many instances, under observation before clinical signs of the disease developed.

As has been found by other investigators, the examination of non-familial sexual contacts was the most productive in the finding of new cases of infectious syphilis.

SUMMARY

1. Contact investigations were carried out as a routine measure by the regular staff in a series of 269 cases of primary and secondary syphilis admitted to the syphilis clinic of the New York Hospital during the years 1937 to 1940 inclusive.

2. These 269 cases named 663 contacts (2.46 contacts per case). Of these contacts, 541, or 81.7 per cent, were found and examined.

3. As a result of contact investigation of these 269 original cases, 224 new cases of infectious syphilis were found. This is a ratio of 83.3 new cases of infectious syphilis for every 100 original cases.

4. The approximate cost of carrying out these investigations was $18 per contact found to have infectious syphilis.

5. The *probable* "source" of infection was thought to be known in 170, or 63.2 per cent, of the original cases. Of this number, 98, or 58.2 per cent, were found and brought under treatment.

6. Epidemiological investigation of cases of infectious syphilis would appear to be both feasible and financially possible in a large metropolitan area such as the City of New York. Such investigations can be carried out by a voluntary hospital. It is suggested that the follow-up and the bringing under observation of all contacts of cases of infectious syphilis is a direct responsibility of the clinic or individual undertaking the treatment of these cases.

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YESTERDAY'S SCHOOL CHILDREN ARE EXAMINED FOR THE ARMY

IT is now fairly common knowledge that a large proportion of the young men of the country, examined by Selective Service Boards, have been found physically or mentally unfit for military service. On learning this the public has been astonished, sociologists appear somewhat apprehensive, and that part of the medical profession accustomed to deal only with the frankly sick has been disquieted. These findings, however, have not come as a surprise to those engaged in public health work for they knew these young men when they were school children, and on the basis of that knowledge could have forecast, with fair accuracy, just about what would be found on physical and mental examination some ten or fifteen years after.

Reacting from its astonishment, the public is inclined to ask who is responsible, and repeats the old plaint, frequently heard in other elements of our defense preparation: why were we not told of these things? In this instance the public was told, and told repeatedly. Public appropriating bodies were informed and when yesterday's school children, under the auspices of one agency or another were examined, school physicians, dentists, nurses, and teachers urged parents, time and again, to have these children's defects corrected and otherwise to inaugurate a hygienic regimen. Some did this, others through ignorance, procrastination, or lack of funds did not. The results are as would be expected. It is, however, more difficult to answer the public's question as to who is responsible for these health deficiencies in man power. It must be borne in mind that a certain amount of disability in a population is inevitable. There are limits beyond which preventive medicine cannot go, and there are pathological conditions which do not permit of correction or complete recovery; and no one may force a mother to take her child to a doctor or a dentist. But the recognition of these things does not entirely account for failure to insure a higher level of health in men of military age. A number of other factors have operated. It is impossible to discover them all or to determine exactly their relative importance, but consideration

of the part played by the following groups, situations, and influences may be of value as guides for the future.

One of the most serious deterrents to better national health would seem to have been the attitude, even worse in the past than at present, of those who have held the purse strings of national, state, and local governments. With few exceptions, politicians' eyes have been as blind to health needs as have their ears been deaf to pleas for more adequate public health appropriations, and few votes were lost by this indifference. A second factor, largely responsible for disabilities in public health, is undoubtedly the public itself. The average individual calls for medical care only when incapacitated. He is but little concerned with what, to him, is a minor disability, the correction of which may cause discomfort or waste money. Even though his knowledge of health matters is meager, only to a very limited extent has he acted upon what he already knows. A third influence bearing upon the health of the nation is, of course, economic. No inconsiderable proportion of the public lacks funds with which to obtain the necessities of healthful living, which, among other things, includes hygienic housing, adequate and balanced nutrition, and medical and dental services. Aggravating this situation is the fact that in most sections of the nation there is an inadequacy of public hospital and clinic service, particularly dental, and other public medical facilities. Making such facilities available has been delayed, possibly in the long run wisely delayed, by the clash of conservative and radical opinion as to how this might best be done.

Some of the deficiencies in the public health must in all fairness be charged to medical education, which has tended to foster in the doctor of tomorrow a too exclusive interest in the frankly sick individual. It has not instilled in him a sense of responsibility for the maintenance of health in his patients, and has left the student unaware of the serious burden which society bears in mildly sick or partially disabled citizens. Conventional medical education of the past, too, has provided the medical graduate with but little appreciation of the implications of disease in the mass. Finally, a minor responsibility for the defects in yesterday's school children must be borne by health agencies. A tendency to routinism in many health departments and a seemingly inevitable confusion and overlapping among the voluntary health services, have not contributed to forehanded and effective action in meeting the rapidly changing demands made by public health problems. On the whole, public health work has been creditable. It could have been better with the funds available, and excellent results could have been obtained with more nearly adequate funds and better trained workers.

These then, aside from limitations in knowledge, appear to be the more important of the factors which have operated to the disadvantage of national health. Some of them, in their cause and effect, are as complex as human nature itself; some are inherent in a struggle for existence; and still others arise and probably always will be present as by-products of a not perfect social order. This being the case, not all of these forces can be immediately or completely offset, but those problems which relate to medical education and public health practice are not impossible to solve. Perhaps, too, now that the public is somewhat alarmed, there may come a belated recognition that hard money is a necessary supplement to the politicians' affable but non-productive agreement that public health is a valuable asset.

THE DEATH OF DR. W. FRANK WALKER

ON September 27, 1941, Dr. W. Frank Walker died, after a short illness, in New York City. This came as a terrible shock to those closely associated with him, and will sadden old associates and other friends scattered widely throughout the public health world. No one suspected that his health was seriously impaired, for he went the even and active tenor of his ways with no reference to what he considered his own problem. Characteristic of the man was this ability to carry his own load, and to bear, too, a considerable part of the burden of others without breaking his active stride.

From first service with the Detroit Department of Health in 1914 to and throughout his work with the Commonwealth Fund, Dr. Walker's life was a busy and productive one. His professional training was that of an engineer. Upon this foundation he built his graduate education, acquiring the degree of Doctor of Public Health from the University of Michigan in 1922. Early in his career he served as a Sanitary Engineer in the Detroit Department of Health and later as Deputy Commissioner. After the first World War, having served as First Lieutenant in the Sanitary Corps, U. S. Army, he returned to Detroit and gained a new and valuable type of experience as Superintendent of the Detroit Municipal Tuberculosis Sanatorium. From 1923 to September, 1925, he was a research associate of the American Child Health Association, at that time actively engaged in carrying on the well remembered survey of health work in 86 American cities.

In late 1925 the Committee on Administrative Practice of the American Public Health Association was faced with filling the position of Field Director, recently made vacant by the resignation of Dr. Watson S. Rankin. In view of the background, training, experience, and personality needed in this position, the Committee turned rather naturally to Frank Walker, and this job he did even more brilliantly than had been hoped. With the backing of the experienced personnel of this Committee and with his own admirable approach and keen insight, he created a new state of mind in public health workers. He did not "inspect" their departments but, with rare tact, made them inspect themselves. And what a going-over that was! Departmental self-satisfaction was faced with sharp facts, and assumptions became apparent for what they were. To do a job of this sort and then to be welcomed back a year after as an old friend, is no mean accomplishment.

In the meantime, the Commonwealth Fund, out of its Child Health Demonstrations, had been accumulating a rich store of study material. Because of this and in view of its planned program, the Fund felt the need of a person possessing Dr. Walker's background and personality. He went with them as Director of the Division of Health Studies in 1931, and here his abilities reached full development. Not only did he continue his analyses of active health programs, but he developed excellent critical and interpretive studies of accumulated data and experiences. Out of the latter came his books, ***Recording of Local Health Work,*** in 1935, and ***School Health Studies,*** in 1941 (both in collaboration with Carolina R. Randolph). He was also the author of ***Influence of a Rural Health Program*** and ***Ten Years of Rural Health Work.*** These contributions he published through the Commonwealth Fund. He found time too to participate actively in Delta Omega's publication of ***Panum on Measles,*** and the amount

of effort and wise counsel he gave to various committees epitomizes his versatility and his willingness to give of himself.

Perhaps more than anyone else in the public health field, Frank Walker held the professional respect, the confidence, and the affection of divergent and sometimes conflicting groups. They were guided by him, and they trusted him. He fought their battles when he thought them right, and he persuaded them of their wrongness when necessary. His ability and his warm personality will be missed in many, many places.

Credit Lines

A Selective Digest of Diversified Health Interests

D. B. Armstrong, M.D., and John Lentz, M.S.

CONTENTS NOTED

Dear Reader:

On our desk are copies of letters written by a health officer in answer to inquiries from anxious parents. This exchange of correspondence was brought about by a recent epidemic of poliomyelitis which, to parents, is perhaps the most feared of all diseases. The letters to the health officer reveal much of the anguish that wells up in the minds of mothers and fathers when the disease is prevalent in a community. Moreover, the faith and dependence placed in the health officer by the public are evident in these letters. But of more importance is the manner in which the health officer responded. In the most considerate and painstaking way parents were given answers to their questions—answers that set forth the latest scientific information about the disease in terms that any layman could comprehend. And each letter ends with a sympathetic paragraph to allay unnecessary fears.

It strikes us that here is another example of effective health education. Ordinarily letters would not be included among the usual media of informing the public. But isn't it time to recognize correspondence along with booklets, motion pictures, exhibits, posters, and the like as an implement of health education? Certainly the correspondence which we have examined seems to indicate that letters can be a potent and effective channel for the dissemination of health information.

No one wants to be told how to write letters, but here are a few pointers which those who handle large volumes of correspondence have found helpful:

1. Letters should be natural. A letter should "talk" just as humanly as the writer would speak.
2. Letters must be sincere. The writer should keep one thing in mind constantly—every letter must be of maximum helpfulness and of maximum value in winning good will.
3. Give all the pertinent facts. The reader has confidence in the man who knows what he is talking about.
4. Letters should be clear and understandable. Every needless word and every word misused, slows down the thought.
5. To write a good letter we need only make sure what we wish to say and say just that, without embroidery.

Remember: Letters are vital. They have saved lives and condemned people to death. They can make friends or lose them.

OUR CHOSEN PROFESSION

A survey was recently made by Arthur W. Towne, Secretary of the Onondaga Health Association of Syracuse, N. Y., to ascertain the extent to which the larger municipal health departments employ health educators, either on a full-time or part-time basis. A questionnaire was sent to health

Please address samples of printed material, comments, or other editorial contributions to the editors at One Madison Avenue, New York, N. Y.

officers in 56 cities of the United States having a population of 150,000 or more. No information was sought concerning persons, whether employed by health departments or by school authorities, charged with health education in schools.

Replies to Mr. Towne's questionnaire were received from the health officer of each of the 56 cities. Just 5 health departments in the entire group reported employment of full-time community health educators. The cities having this service were New York, Boston, Washington, Detroit, and Louisville. In addition, a private foundation, the Clara Elizabeth Fund, furnishes the salary for a trained health educator in the Flint Health Department, Flint, Mich. Three health officers reported the employment of part-time health educators.

Additional data gleaned from the survey showed that persons holding the positions of health educators include both physicians and laymen. New York City and Detroit have well organized health education bureaus, each with about a dozen workers and with annual budgets of $64,000 and $40,000 respectively.

All 5 cities having full-time directors of community health education reported the use of the usual media and methods of health education. Their subject matter covers the usual major health problems. The programs differ, however, in the relative extent to which these different avenues of publicity and education are utilized as well as in their relative emphasis upon different problems.

From the foregoing findings, it is apparent that much room exists for further progress on the part of American cities, if they are to live up to ideal standards with regard to community health education. In many places the most active health education service is still rendered by private associations. A conclusion reached through the inquiry was that health educators should be employed both in governmental and in voluntary agencies.

FOR MOTHERS AND BABIES

Are you familiar with the services of the National Maternal and Child Health Council? This organization functions as an advisory center on problems bearing on the health of mothers and babies. It seeks ways and means of bringing to greater fruitfulness current knowledge and technics related to maternal and infant care, and it acts as a clearinghouse for teaching and publicity materials in this field. The Council does no field or demonstration work, but consultation and active assistance will be given upon request to state and local groups promoting maternal and child care programs. The Council is made up of some sixty member organizations representing many professions.

The Council has compiled very comprehensive catalogues listing the best pamphlet, exhibit, poster, and film materials available on maternal and child care, and is planning study courses suggesting ways in which these materials may be used. Health agencies will find these catalogues very useful.

An interesting leaflet issued biweekly by the Council, called "Clearing House Notes," is available free of charge. This publication reports briefly and factually on medical and environmental problems pertaining to mothers and babies. Material in this leaflet may be used in radio addresses, speeches, classroom work, libraries, and "even for effective conversational purposes."

Those interested in learning more of the Council's work and in obtaining its printed materials should address inquiries to Mrs. Gordon Wagenet, Executive Secretary, National Maternal and Child Health Council, 1710 Eye St., N.W., Washington, D. C.

NOTES ON PUBLICATIONS

Health agencies are beginning to focus their attention on appendicitis as a disease that may be subject to control by public health measures. Evidence of this fact comes from the Department of Public Health of the State of Illinois which has published an excellent bulletin on the subject entitled "A Message About Appendicitis." There are certain essential facts about this disease that the public should know—namely, that any stomach-ache may turn out to be appendicitis, that early hospitalization increases the chance of recovery, and that no laxatives should be taken when suspicious abdominal pains persist. These facts are duly emphasized in the Illinois booklet. Conspicuous by its absence is any reference in the text to the application of heat or cold to the abdomen. The consensus among medical authorities is that either practice is harmful, though both are still advocated in some quarters. Now that one health department has taken the lead in spreading information about appendicitis, others should follow suit as the public could be greatly benefited by collaborative efforts between health agencies and the medical profession to control the disease. "A Message About Appendicitis" is available from the State Department of Public Health, Springfield, Ill.

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Everyone interested in venereal disease control should read the important report by Maurice A. Bigelow, Ph.D., entitled "Health Education in Relation to Venereal Disease Control Education." This report, which appeared originally in the February, 1941, issue of the *Journal of Social Hygiene*, has been reprinted in booklet form and is now available from the American Social Hygiene Association, 1790 Broadway, New York, N. Y., at *25 cents per copy*. The report is based on a coöperative project conducted jointly by the A.S.H.A. and the U. S. Public Health Service. Dr. Bigelow's very thorough study is based on personal conferences with health officials, physicians, educators, ministers, and parents in 18 states. Additional information from areas outside the 18 selected states was obtained by correspondence. Thus the data presented in this report are comprehensive and enlightening. Among the interesting conclusions presented in this study are: (1) "Direct teaching concerning the venereal diseases as communicable diseases is the most important educational attack, so far as protection of the individual is concerned"; and (2) "... all education which makes for character and understanding of the natural relations of the two sexes is indirectly and in the long run very important for venereal disease control."

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First aid training is one of the principal items on the agenda of the Medical Division of the Office of Civilian Defense. Courses are already being given in many localities, and the need for authoritative publications setting forth the essentials of first aid will mount as the government's civilian defense program expands. Hence the first aid booklet of the U. S. Public Health Service comes along at a most opportune time. This publication was recently released under the title "Until the Doctor Comes." It was written by James A. Dolce, M.D. This manual has many admirable features. Practically all the important first aid practices are adequately but briefly covered. There is no extra verbiage in any of the directions, a feature that is highly desirable in a first aid book, where compactness and conciseness are essential if the book is to be used "on the spot" rather than for study. The organization of this publication is another of its admirable

features, as are the various diagrams, which are unsually clear in illustrating the fine points of various first aid technics. The book is also well executed from the standpoint of layout and typography. Copies of "Until the Doctor Comes" are available at *10 cents each*, from the Superintendent of Documents, Washington, D. C.

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"Sex Education for All Ages" would make an appropriate title for a series of booklets recently issued by the Bureau of Health and Public Instruction of the American Medical Association. The series is composed of five booklets, especially written for different age levels as the following individual titles indicate: Sex Education of the Pre-School Child, Sex Education of the Ten Year Old, Sex Education for the Adolescent, Sex Education for the Married Couple, and Sex Education for the Woman at Menopause. The text of each booklet originally appeared in *Hygeia*. The authors are all well known authorities in the social hygiene field and their treatment of the subject matter is expertly handled so as to provide laymen with practical instruction and counsel. A valuable list of supplementary sources of information is included in each booklet. The booklets, attractively printed and bound, are illustrated with clear anatomical drawings and pleasant photographs. These pamphlets are highly recommended. Priced at *15 cents each*, or *$5.00 per 100*, they may be secured from the A.M.A. at 535 N. Dearborn Street, Chicago, Ill.

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"When Your Child's in the Teens" is the title of a new booklet recently made available by the John Hancock Mutual Life Insurance Company, Boston, Mass. Publications dealing with the "turbulent teens" are always in demand, and this well written booklet by Edwina A. Cowan, Ph.D., should be most helpful to parents. The author covers the subject thoroughly, and the sections on security, temperament, and love affairs are particularly good. We wonder why the all-important matter of rest was omitted. The final paragraph in this publication is worth quoting: "To put the whole matter in a nutshell, infinite patience, outspoken confidence in each other's judgment, and sympathetic understanding of the fine problems involved, those are the tools with which parents may most successfully help their children through the turbulent teens." The booklet is available without cost.

A "MUST" ITEM

"An editorial achievement" — this phrase could be aptly applied to practically any issue of *Consumers' Guide*, a publication of the U. S. Department of Agriculture. The June–July, 1941, issue, however, more than fulfils the expectations of readers who follow this publication regularly. A reportorial job of such general excellence is not often encountered and "Credit Lines" is happy to commend the individuals who are chiefly responsible for *Consumers' Guide* — D. E. Montgomery, Consumers' Counsel, and Mary Taylor, Editor.

The June–July issue is devoted to the National Nutrition Conference which the President called in Washington last May. By means of excerpts from the various papers and speeches presented at the conference, readers are given an excellent summary of the scope of the nutrition problem and the responsibility that must be met by many diverse groups, if "we are to have a people who have enough to eat." There has been no better popular presentation of the facts about nutrition than in this publication. The text is enhanced considerably by a series of well chosen photographs.

Consumers' Guide may be obtained from the Superintendent of Documents, Washington, D. C., at *5 cents per copy*, or by subscription at *50 cents a year*. Every health worker should have access to this journal.

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RE: "LISTEN, AMERICA"

The favorable reception accorded the series of radio programs "Listen, America," which were broadcast weekly during the summer by NBC, has resulted in the continuation of this series on the air. Readers who heard the original programs will recall the effective dramatizations of outstanding achievements in nutrition which this series featured. After a brief absence from the airways, "Listen, America" was resumed on October 19 and is to continue over the Red Network of NBC each Sunday for thirteen consecutive weeks. The program is broadcast from 3:30 o'clock to 4 o'clock, Eastern Standard Time.

The programs are given under the auspices of the Women's National Emergency Committee, the U. S. Public Health Service, the U. S. Department of Agriculture, and the Federal Security Agency. The original plan of the program is being followed in the new series, which calls for the weekly appearance of leading authorities in nutrition and "guest stars" from the stage, the screen, and other fields.

The programs stress the fact that good health and full strength are based on good food. The scope of future programs will be broadened to embrace topics related to morale and the general welfare of the American people. The theme for all the programs in this series stems from Surgeon General Thomas Parran's statement: "Food will build a better America."

Readers are urged to tune in on "Listen, America." The programs have been enthusiastically endorsed by many authorities and the public's response indicates that the broadcast are a hit.

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A NEW FILM PROJECT

The American Film Center, 45 Rockefeller Plaza, New York, N. Y., has announced the establishment of a section on films in health education, with Adolph Nichtenhauser, M.D., in charge.

The new section will be a clearing-house and information center on the use and production of health education and medical films. Through this section the American Film Center will evaluate existing health films in collaboration with health experts and publish from time to time lists of recommended films. Cooperation with the many groups using health films will be sought in order to create a solid economic basis for their production. A long-range production program will be developed in collaboration with competent agencies.

Attention will also be paid to the technical medical film, especially with regard to its use in medical schools. From its beginning the American Film Center has coöperated with medical and scientific agencies, such as the Wistar Institute of Anatomy and Biology in Philadelphia, and various hospitals in New York and New England, in the study and production of films.

Dr. Nichtenhauser has been working in educational cinematography for many years. Before joining the Center he was on the staff of the National Tuberculosis Association and of the New York Tuberculosis and Health Association, where he worked on health films. The Section on Health and Medical Films has received a 3 year grant from the Rockefeller Foundation.

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MAGAZINE ARTICLES

Current popular magazine articles on health or of medical import:

"Physical Fitness and the Draft." Nathan Sinai. *Harpers Magazine*, October, 1941
"Camp Followers of the Army." Gretta Palmer. *Ladies Home Journal*, October, 1941
"I Collect People." Paul de Kruif. *Ladies' Home Journal*, October, 1941
"What a Woman Obstetrician Does." No Author listed. *Good Housekeeping*, October, 1941
"Anemia." Maxine Davis. *Good Housekeeping*, October, 1941
"Worry Goes to the Stomach." Helen Haberman. *Cosmopolitan Magazine*, November, 1941
"And Still They Die." Arthur Bartlett. *Woman's Home Companion*, October, 1941
"Are You Really Getting Your Minerals?" Donald G. Cooley. *Better Homes and Gardens*, September, 1941
"It May Be Allergy." Lois Mattox Miller. *Better Homes and Gardens*, September, 1941
"Is There New Hope for Epileptics?" W. W. Bauer, M.D. *The American Mercury*, October, 1941

(The above is not presented as a complete list and the articles cited are not necessarily recommended.)

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JOTTINGS

Did you see "Know for Sure," a film on venereal disease, during the Association Annual Meeting? This is the first health film in which Hollywood producers have collaborated. This picture was made by 20th Century-Fox from a script developed by the U. S. Public Health Service, and a professional scenario writer, John Sutherland. Lewis Milestone, one of Hollywood's leading directors, is in charge of production. The film will be made in Spanish and Portuguese versions for showing in Latin American countries. "Know for Sure" was enthusiastically received by A.P.H.A. audiences in Atlantic City. . . . The Bureau of Social Hygiene of the Department of Health of New York City is distributing an interesting publication entitled "Hall of Fame in Social Hygiene." This leaflet deals with the historical aspects of syphilis from the time of Columbus to the time of Ehrlich. . . . The September, 1941, issue of *The Journal of Pediatrics* contains a wealth of material on adolescence that will be particularly valuable to school health workers. Authoritative papers covering practically all the medical and psychological aspects of the adolescent years are found in the *Journal*. . . . Speaking of slogans (as we were in the last issue) the following is being used by one of the government agencies:

"A pig,
A cow,
24 chickens and a rooster
And you'll live better than you uster." . . .

Publishers' fall lists of forthcoming books bristle with titles of interest to public health workers: "Lifting the Shadow" by Parran and Vonderlehr, "Behind the Mask of Medicine" by Miles Atkinson, and biographies of the Mayo Brothers, William Henry Welch, and William Hallock Park. . . . *Life Magazine* (issue of September 29, 1941) published an excellent photographic essay on "First Aid." The "strawberry jam" pictures were unusually realistic and no doubt gave many a layman a good idea of the unpleasant sights that a first aid worker must calmly face. . . . Joke of the Month: A popular booklet on venereal disease distributed by the Metropolitan Life Insurance Company is called "The Great Imitator." A policy holder, seeing the booklet on display in a reception room, asked for a copy. "I want to take this home to my husband," she remarked, "may help him improve his imitations of Jack Benny and Fred Allen." . . . A splendid example of community coöperation in a health campaign is reported by John St. Peter of the Pittsburgh Syphilis Control Project. With the assistance of the WPA, an advertising agency, and a transportation company, syphilis posters were placed in every street car and bus operating in the city. It is reported that not one complaint was received and

that the publicity resulted in a noticeable increase in the patient load at local clinics, which were mentioned on the poster. . . . Have you seen any of the arresting photographs of bacteria made by means of the electron microscope? Health publications can certainly make use of these as the public always wants to know what this or that germ "looks like." . . . Recommended reading: "America in a World at War" by Clifton M. Utley in the October, 1941, issue of the *Journal of Home Economics*. . . . Just as we go to press, the 1940 annual report of the New York City Department of Health reaches us. While we have not yet had time to read this volume carefully, we can say that it makes a most favorable impression, being attractively bound and illustrated, and evidently written in a style that is not only intelligible for the lay citizen, but that interprets in a human fashion the tremendous variety of scientific and educational activities of this great Department of Health. No doubt the report, approaching 300 pages in length, will be more extensively reviewed subsequently in this JOURNAL. Our congratulations to Commissioner Rice! . . . Quotation of the Month: "If we replace an *average* diet with an *adequate* diet, we get a 10 per cent increase in the active virile life span. This would mean more in terms of human longevity than to wipe out cancer as a cause of death." (From a speech by Surgeon General Parran.)

BOOKS AND REPORTS

The Analytical Chemistry of Industrial Poisons, Hazards and Solvents — *By Morris B. Jacobs, Ph.D. New York: Interscience Publishers, Inc.*, 1941. 661 pp. 110 text-figs. Price, $7.00.

Along with the great technological advances of the past quarter of a century there has been a quickening of interest in the health of the worker and increasing study has been made of his environmental conditions. Prevention rather than cure has come to be the accepted point of view.

An important division of industrial hygiene is that of industrial poisons, the recent growth of which is well indicated by the ground covered in *Analytical Chemistry of Industrial Poisons, Hazards and Solvents*. This book is written primarily for the analytical chemist in the field of industrial hygiene and is therefore largely a collection of methods of analysis. However, much incidental information is given with respect to the physiological response to and toxicity of harmful dusts, fumes and vapors, which makes the book of value to all industrial hygienists.

Roughly the book is divided into three sections comprising Sampling, Gas Measurement and Dusts (159 pages); Inorganic Industrial Poisons (199 pages); and Organic Industrial Poisons (257 pages). This summary appraisement gives a very inadequate idea of its scope, however. The 19 chapters discuss in succession a long and imposing list of industrial poisons and their analytical determination, with a final chapter devoted to chemical warfare agents. There are 18 pages of tables in the appendix, ranging from conversion tables for gases to safe concentration limits for industrial dusts. The literature has been particularly well reviewed with reference to analytical procedure. Wherever possible several methods of evaluation are given and these methods are described in detail. The extensive amount of information thus made available should be of the greatest assistance not only to the chemist but to all those interested in industrial poisons.

The book is well indexed, clearly printed, and amply illustrated.

L. T. FAIRHALL

A Manual of Allergy—*By Milton B. Cohen. New York: Hoeber*, 1941. 156 pp. Price, $2.00.

The author explains the writing of this book in the fact that while there are satisfactory large texts on the subject for the use of allergists, and while there are popular books through which the layman can understand allergy, there is need for an intermediate volume which will serve the medical man whose interest is only secondary and who does not wish to burden himself with extensive reading of the large volumes.

Dr. Cohen's many important contributions to the subject give to his writings a generally recognized authoritativeness.

The book is well written and covers the subject excellently to the extent that general practitioners and non-medical persons as well can gain a clear understanding of the processes of allergy. One is left with the feeling that Dr. Cohen would have done well to have enlarged it a little more with detailed discussion of the routines of specific diagnosis and treatment. One who has read the book and desires to proceed

with allergic studies must still refer to the larger volumes. Although it would be desirable to have it all in one book, there is justification for the author's plan of presentation, in that those who actually wish to use allergic procedures should become acquainted with intricate details as well as with general principles. This certainly should make for better allergic practice.

In this sense we might consider the present volume as an Introduction to Allergy. WARREN T. VAUGHAN

A Yankee Doctor in Paradise—*By S. M. Lambert, M.D. Boston: Little, Brown,* 1941. 393 pp. Price, $3.00.

This book is well worth reading from a dozen different standpoints. The author was sent by the Rockefeller Foundation to tackle hookworm, first in Papua, but spent 21 years in the South Sea Islands, going to many. He did not confine himself to hookworm. As a book of adventure, it is a fascinating story. However, our chief interest lies in the public health aspect and the great work which was carried out under the Rockefeller Foundation and largely by funds supplied by it. On some islands he was ably seconded by the English Commissioners and medical officers. One must admire the vision which led the Foundation to undertake the problem of cleaning up the South Sea Islands or even making a survey of the many ills which affect the natives. Accomplishments have equalled the vision.

The author gives us a good deal of anthropology, ethnology, comments upon social customs, trading, missionaries, superstitions with ghosts and black magic, which are interesting in themselves and have had much to do with the health of the natives and their acceptance or rejection of modern medicine.

Outstanding is the discovery of Maurice C. Hall, U. S. Bureau of Animal Industry, published in November, 1921. Chenopodium had been the sole "cure" for hookworm, but all workers were becoming disappointed, and Dr. Gilbert was at his wit's end, when like a voice from Heaven came this article in the *J.A.M.A.*, "The Use of Carbon Tetrachloride in the Removal of Hookworm." Though the Foundation cabled him, "Forbid use. We do not experiment with human life," he was able to try it through the coöperation of the Chief Medical Officer, Dr. Aubrey Montague. Medically this was the great answer to the hookworm problem. Unfortunately, in telling the story he says we must remember that "modern anesthesia originated in a dentist's brain," giving credit to Morton for a discovery which belongs to Dr. Crawford Long, of Georgia.

Sketches are given of the inhabitants of various islands. Many of these the author places very high physically, morally, and intellectually. He puts the Fijians, "Natives of the Cannibal Islands," at the top. Their rapid advance "From Cannibalism to Calvinism" is remarkable and he gives delightful sketches of their character. One of the author's great accomplishments was the establishment of a medical school in Suva. He gives charming pictures of Fijians who became skilled surgeons and suggests that this flair is due to their former cannibalism since cannibals are anatomists "and their gruesome habits made them familiar with the set-up of the human body. . . . Neither ways were pretty roads to knowledge, but strange things have happened in the Martyrdom of Man."

These people are naturally hospitable and delightful, splendid physically as well as mentally. Their kindly natures have had much to do with their physical downfall and the author repeatedly says that the main cause of the depopulation in the Pacific is the introduction of diseases to which the natives have no

immunity. "Epidempics are the fruits of island hospitality." Cannibalism and head-hunting were rough blessings because they quarantined tribe against tribe. Missionaries and tradesmen have done too much in introducing disease. ". . . witness once more the greasy Mother Hubbards, layer on layer, pressing oil and germs into their beautiful bodies." He does not believe that the missionaries have succeeded in Christianizing these people, not even the Fijians. "Christianity had its place—it was 'society,' . . . It had an amusement value." He quotes a missionary on Trobriand Island, a graduate of Oxford, as saying he had made not one convert in 20 years, but this man has done a splendid work in civilizing and educating.

While for certain of the natives, notably those on the Island of Tahiti, which he did not visit, seem doomed to extinction, for others the outlook seems good. The formula is native doctors and nurses to treat disease and teach prevention, especially soil sanitation by proper care of the discharges from the body, and pure water supplies, all under the supervision of competent European physicians and nurses. There must also be a careful study of native customs and "respect for the more wholesome of the folk ways that have given life's zest to these people." In the past civilization has been a very doubtful blessing to the South Sea Islands, but the dawn of public health and modern medicine seems to have made the future hopeful. Civilization has given them venereal diseases, hookworm, tuberculosis, and leprosy. Yaws is widely prevalent but is being conquered by salvarsan.

The book is delightfully written. The author has a keen sense of humor, is a philosopher, and a good deal of a poet. Some of his descriptions are beautiful. He confesses to a homesickness whenever he thinks of Fiji, which has the most perfect climate in the world. The book is a fit companion piece to Heiser's *An American Doctor's Odyssey*, and can be recommended to every class of reader.

MAZŸCK P. RAVENEL

Training and Efficiency — *An Experiment in Physical and Economic Rehabilitation—By Johl, Cluver, Goldvolk, and DeJongh. Johannesburg: South African Institute for Medical Research*, 1941. 188 pp.

A group of some 14,000 unemployed young men went to a training camp and for the first time in their lives experienced a régime of strict discipline. For six months "they lived in well-kept tents and barracks; slept in proper beds; received a well-balanced diet; had to follow a carefully elaborate timetable, which set aside ample time for recreation." They received 3 hours of physical training per day.

After the first month they liked it.

What happened to them physically?

Thirty-two young men were selected as indicators. Anthropometric and performance tests were given. The story of change at 6 week intervals may be read from the many tables and charts.

Marked improvement in body functioning occurred. Significant is the fact that long periods of rigid drill in the hot sun were altered as a result of the evidence accumulated. Instead more stress was laid on "free movements and play activities."

A conclusion is reached that a low standard of fitness and efficiency "is not due to a basic biologic defect, but that it is largely the expression of environmental shortcomings." And this is changeable. National planners may well ponder over these results, war or no war.

Army camp commanders and physical educators should welcome this report. It is splendid, packed full of carefully drawn dependable data that go far toward satisfying a longing for some objective measurements of changes in health.

GEORGE T. PALMER

Biological Symposia—Volume II—*Edited by Jaques Cattell. Lancaster, Pa.: Jaques Cattell Press*, 1941. 270 pp. Price, $2.50.

The second volume in the series of Biological Symposia includes a number of separate symposia on: (1) Speciation, (2) Defense Mechanisms in Plants and Animals, (3) Biological Basis of Social Problems, and (4) Regeneration. In the first symposium "Speciation" is defined as the process by which new species develop (p. 60), and a careful analysis is made of the meaning of the term "species." The whole symposium is well summarized by Dobzhansky (p. 122): "By speciation is meant the fixation of discontinuity among organism. Discontinuity is maintained by isolating mechanisms that prevent the interbreeding of carriers of different adaptive complexes of genes."

The second symposium is made up of three papers on defense mechanisms in plants and animals. The first discusses local reactions in plants, the second generalized defense reactions in plants, while the third describes defense reactions in animals. To a student of human disease the first two papers should prove extremely interesting. In the third symposium there is much of a controversial nature, as might be expected from the subject. An example is Child's attempt to picture social integration as a biological process, which involves classifying stages of biological evolution as "communistic," "autocratic," and "democratic" (p. 177).

The fourth symposium on Regeneration, deals solely with invertebrate forms, but can be read with interest by most physicians. HERBERT HOFF

Biological Symposia — Volume III, Muscles—*Edited by Jaques Cattell. Lancaster, Pa.: Jaques Cattell Press*, 1941. 370 pp. Price, $3.50.

This volume is an expansion of papers presented at a symposium on muscle physiology organized by Prof. W. O. Fenn for the annual meeting in 1940 of the American Physiological Society. It presents the specialized viewpoints of a number of the most active workers in the field of muscle physiology, and is a volume of great importance to other students of that subject. The subject of the electrical activity of muscle is especially well treated in a number of papers, and transmission at the neuro-muscular junction continues to be the subject of lively controversy. A notable feature is the attention given to smooth muscle, which has been too readily dismissed in the past. The implications of Astbury's work on protein structure in relation to muscle contraction are ably discussed. The chemistry of muscular contraction has been neglected purposely, but an interesting chapter by Meyerhof is included, entitled "The significance of oxidations for muscular contraction." Readers of this chapter will probably keep in mind Millikan's paper in *Physiological Reviews* for July, 1940. There is a most stimulating chapter on electrolyte equilibrium in muscle.

The point of view that makes this volume so very interesting to the physiologist interested in muscle renders it somewhat less adequate as a general account of muscle physiology, and limits its value to the general reader and the beginning student. HERBERT HOFF

Papers of Wade Hampton Frost, M.D. A Contribution to Epidemiological Method—*Edited by Kenneth F. Maxcy, M.D. New York: The Commonwealth Fund*, 1941. 628 pp. Price, $3.00.

Here is a book that does not need a review, and indeed one would have to be bold to attempt either a review or a criticism. All it needs is a notice of its publication.

A short Preface tells us that Dr. Frost made no collection of his writings,

which, however, seemed of so much importance, both in themselves and also in representing the evolution of epidemiology, that a group of his associates and former students have selected from his published papers a certain number, have arranged them in groups which illustrate the methods practised and taught by the author and which have had such an outstanding influence on the conception of epidemiology, not only in this country but in others.

The book opens with a paragraph defining epidemiology in Dr. Frost's own words found in an introduction to the reprinting of the papers by Dr. John Snow in 1853–55. We know of no better definition that has been given.

These papers have been collected not only as a labor of love on the part of associates and students, but, as said in the title, as a "contribution to epidemiological method" and to illustrate "the extent to which his work and teaching had contributed to the transformation of epidemiology from a speculative and descriptive methodology to an analytic and productive science. . . ." The purpose of this book is to perpetuate Frost's influence and teaching. The papers are on various subjects and "though diverse in nature, they reflect the ever-increasing care and precision with which he ordered evidence, his capacity to use numbers effectively in reasoning, and the progressive clarification of his philosophical concepts."

Following this lucid exposition of the motives and methods which dominated Frost's work, the Introduction gives an understanding sketch of his life and work, tells how he progressed from one phase of his work to another, and gives the names of many of those with whom he came in contact and who influenced the trend of his interests and work.

Whatever might be written in the way of a review of this book could be little more than an abstract of the excellent introduction with its faithful picture of the development of an orderly and critical mind and the expanding interests of a character which made him from the beginning of his career an outstanding figure. Without belittling the excellent and pioneer work of his associates, it is safe to say that no single man made a greater impress on the development of epidemiology than did Dr. Frost.

One must acknowledge a debt of gratitude to the editor and the group who worked with him, and to the Division of Publications of the Commonwealth Fund for making this book available. An unfortunate error is found in a footnote on page 5, where Sir Rupert Boyce is referred to as Robert Boyce. The reference is otherwise correct. With this exception the printing and make-up are excellent.

MAZYCK P. RAVENEL

Doctors Don't Believe It — Why Should You?—*By August A. Thomen. New York: Simon & Schuster,* 1941. 384 pp. Price, $2.50.

In an introduction to this new attempt to tell the public what it should know about health and disease, Dr. Logan Clendening appropriately quotes the saying "People will tell you that the truth is simple. Half truths are simple. The whole truth is the most complicated thing in the universe." On this thesis Dr. Thomen has tried to explode many popular fallacies and at the same time, having shown the untruth in the half truth, has attempted to give the reader something of the whole truth.

Obviously, the choice of subjects for such a book is a problem. Here there are ten chapters: on (1) food diet and weight reduction, (2) your daily life, (3) major ailments, (4) venereal diseases, (5) cancer, (6) the common cold, (7) allergy, asthma and hay-fever, (8) minor ailments, (9) mind and senses, (10) birth, marriage and death. In

each a variety of questions are asked: How "whole" is whole wheat bread? How beneficial is suntan? Of what importance is the typing of pneumonia? Is it more dangerous to prick oneself with a pin than with a needle? What are the principles underlying the treatment of tuberculosis? The answers are given in relatively simple, straightforward language with not too obvious attempts to popularize or brighten the topic under consideration. Sometimes the wealth of medical terminology used would seem overpowering, again one wonders why more is not included—but in the main a happy balance has been reached.

There are references to interesting historical, epidemiological, and cultural facts, and sometimes reference is also made to sources for additional information—books, agencies.

A bibliography of 70 volumes is included but, arranged as they are in alphabetical order by author's name, and ranging from the almost inaccessible first Verona edition of Fracastoro's "*Syphilis sive morbus Gallicus*" to a 1938 volume entitled "The Story of Human Error," one wonders how the layman for whom the book is intended can use these references. And, although the questions are asked in a layman's language, the index has been built up around the names of authorities cited or medical terms used so that the layman will probably find it less useful than the text.

It is interesting to note that even the professional person may find some of his pet fallacies laid bare if he goes through the text carefully.

LEONA BAUMGARTNER

Tuberculosis Nursing — *By Grace M. Longhurst. Philadelphia: Davis,* 1941. 280 pp. Price, $3.00.

Although written primarily for student nurses, this book should be invaluable to all nurses as a reference on modern diagnostic and therapeutic procedures in the treatment of tuberculosis. The concise definitions and descriptions of treatments will be appreciated by public health nurses as well as hospital nurses. The book provides too a simple interpretation of scientific information, so is essential to nurses in teaching the lay public facts about the disease and its treatment.

Effective use has been made of isotype graphs provided by the National Tuberculosis Association, and pictures of equipment treatment procedures, and record forms. Bibliographies and review questions at the end of each unit provide stimulation for those who wish to continue their study of this important disease.

The need for an understanding of the psychological approach to the patient's problems has been illustrated by a series of brief case histories. Interesting though these are, it is to be regretted that this important phase of the nursing care of the tuberculosis patient has been treated with such brevity. Also, greater emphasis might well have been given to the importance of the nurse's knowledge of social agencies in the successful treatment and rehabilitation of the tuberculosis patient. Teaching by inference is not always the most successful method of presentation of subject matter. However, the author no doubt rightly assumes that instructors in schools of nursing will give student nurses specific assistance in the utilization of community resources as individual cases come under their care.

Certain it is that any nurse who familiarizes herself with the content of this book will possess not only a more thorough understanding of how to protect herself as well as others from the successful invasion of tubercle bacilli but also a greater ability to present simply the scientific facts about tuberculosis and its various treatments.

MARIE L. JOHNSON

How to **Help Your Hearing**—*By Louise Neuschutz, Foreword by Walter B. Pitkin. New York: Harpers,* 1940. 179 pp. **Price, $2.50.**

This is a sensible, practical book with a hopeful outlook. Availing herself freely, as her well digested bibliography indicates, of what has been written by her predecessors in the field, Mrs. Neuschutz has yet written a study that is not purely derivative. She discusses the problems introduced by a hearing loss and outlines in an intelligent and sympathetic manner the ways in which each may be faced and, to some extent, overcome. She deals with lip-reading, the choice of a hearing-aid, the adjustments necessary in social life and in the economic field, and opens vistas of the surprisingly ample modes of successful adjustment and self-expression that still remain for the handicapped. There are useful suggestions for the preservation of residual hearing and of the speaking voice, and, what is even more important, of morale and mental and physical alertness.

Chapters of advice to the parents of a deafened child and to normal people who have hard of hearing friends are included, and there is an appendix with standard acoustic drills for home practice. Mrs. Neuschutz has a helpful message for those about to take the first steps that lead to rehabilitation.

REGINALD M. ATWATER

BOOKS RECEIVED

HIPPOCRATIC MEDICINE. ITS SPIRIT AND METHOD. By William Arthur Heidel. New York: Columbia University Press, 1941. 149 pp. Price, $2.00.

COMMUNICABLE DISEASE CONTROL. By Gaylord Anderson and Margaret Arnstein. New York: Macmillan, 1941. 434 pp. Price, $4.25.

THE ESSENTIALS OF OCCUPATIONAL DISEASES. By Jewett V. Reed and A. K. Harcourt. Springfield: Thomas, 1941. 225 pp. Price, $4.50.

HOUSING YEARBOOK 1941. Coleman Woodbury and Edmond H. Hoben, Editors. Chicago: National Association of Housing Officials, 1941. 405 pp. Price, $3.00.

PUBLIC HEALTH NURSE IN ACTION. By Marguerite Wales. New York: Macmillan, 1941. 437 pp. Price, $2.75.

THE 1941 YEAR BOOK OF PUBLIC HEALTH. J. C. Geiger, Editor. Chicago: Year Book Publishers, 1941. 544 pp. Price, $3.00.

ORIENTATION IN SCHOOL HEALTH. By Clair V. Langton. New York: Harper, 1941. 680 pp. Price, $3.00.

THE PREMATURE INFANT. By Julius H. Hess and Evelyn C. Lundeen. Philadelphia: Lippincott, 1941. 309 pp. Price, $3.50.

FATAL PARTNERS: WAR AND DISEASE. By Ralph H. Major. New York: Doubleday Doran, 1941. 342 pp. Price, $3.50.

THE MAN WHO LIVED FOR TOMORROW. A Biography of William Hallock Park, M.D. By Wade W. Oliver. New York: Dutton, 1941. 507 pp. Price, $3.75.

THE VOLUNTEER IN PUBLIC HEALTH NURSING. Prepared by Evelyn K. Davis. New York: National Organization for Public Health Nursing, 1941. 48 pp. Price, $.50.

NUTRITION IN EVERYDAY PRACTICE. Series of articles and addresses taken from the Canadian Medical Association Journal, 1938–1939. Evansville: Mead Johnson & Co., 1939. 94 pp. Free.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Industrial Health Pays Dividends—One hundred and sixty million man-days are lost through illness each year or, in terms of industrial wages, three-quarters of a billion dollars. A committee of the N.A.M. reports upon current industrial health services. You'll go far to find so much information packed into ten pages.

ANON. Industrial Health Practices. Ind. Med. 10, 9:388 (Sept.), 1941.

Children's Disease Attacks Adults—In busy, growing Halifax an outbreak of diphtheria made life a nightmare for medical and health authorities in the winter of 1940–1941. A large number of adults were attacked, though the mortality rate among them was much lower than that in children.

CAMPBELL, P. S. The Occurrence of Diphtheria in Halifax from October 1, 1940 to January 31, 1941. Canad. Pub. Health J. 32, 8:404 (Aug.), 1941.

Philosophy of Public Hygiene—If all research in medical sciences ceased, but the fullest use of current knowledge were applied by an eager and informed public, then would come almost unimaginable improvements in the health of Canada. This is only one of many provocative assertions in this inclusive state paper whose scope is indicated by its title.

DOLMAN, C. E. The Health of the Nation. Canad. Pub. Health J. 32, 8:387 (Aug.), 1941.

For Complacent H. O's—Care of mothers and babies in prosperous, fortunate America is compared with that in war-torn England. If you think that we must do better over here with all the means we have at hand, then don't fail to read this address to a class of graduating women physicians.

ELIOT, M. M. The Protection of Children in a National Defense Program. Med. Woman's J. 48, 8:242 (Aug.), 1941.

Influenza A—A complex influenza virus vaccine increases the antibodies against influenza A, and this results in a useful immunity against this type of influenza. Unfortunately, influenza of other known and unknown types is not affected by this vaccine. That part of the public which has heard about this new protective measure is sure to be disappointed.

HORSFALL, F. L., *et al.* Studies in the Efficacy of a Complex Vaccine Against Influenza A. Pub. Health Rep. 56, 38:1863 (Sept. 19), 1941.

More About Nurses and Tuberculosis—Half the student nurses admitted to this Philadelphia hospital were tuberculin-positive and all were in this condition at the close of training. Tuberculous lesions developed later in 5 per cent of the students originally tuberculin-negative. Among the originally tuberculin-positive, the later attack rate was 4 per cent (not a statistically significant difference). There is a lot more in this excellent paper.

ISRAEL, H. L., *et al.* A Study of Tuberculosis Among Students of Nursing. J.A.M.A. 117, 10:839 (Sept. 6), 1941.

Some Epidemiologic Inferences About TB—At the turn of the century when the tuberculosis death rate was above 200, the risk of death among those infected was about 2–2.8:1,000.

Now, when the death rate is lower than 50 the risk of death among the infected has been halved. The conclusion is advanced that the decreased mortality is caused equally by the reduction in sources of infection and by better care. This is reassuring in the light of some recently expressed doubts about the real effect upon tuberculosis mortality of our modern treatment methods.

LANDÉ, K. E., and WOLFF, G. Frequency of Tuberculous Lesions at Autopsy. Am. Rev. Tuberc. 46, 2:223 (Aug.), 1941.

The Hodge-Podge That Is Health Administration. — This introductory chapter to a survey of official state health administrative services is not to be missed. As many as 18 separate agencies contribute to health activities in one state, in none are there less than six. The median number is 11 per state. How the more than $285,000,000 are spent presents an amazing picture.

MOUNTIN, J. W., AND FLOOK, E. Distribution of Health Services in the Structure of State Government. Pub. Health Rep. 56, 34:1673 (Aug. 22), 1941.

Protection Against Tetanus — Most children who failed to achieve satisfactory immunity to diphtheria and tetanus after two doses of the combined toxoids, did so after a third or "repeat" dose. There is a limit beyond which multiple injections fail to increase immunity.

PESHKIN, M. M. Immunity to Tetanus Induced by Combined Alum Precipitated Diphtheria and Tetanus Toxoids. Am. J. Dis. Child. 62, 2:309 (Aug.), 1941.

Scarlet Fever Control—Advocated for the more effective control of scarlet fever are: tests of susceptibility and cultures from contacts, the passive immunization of all about to become ill, and later the active immunization of these, and the immediate immunization of all susceptible contacts.

RHOADS, P. S., *et al.* Management of Scarlet Fever Contacts. J.A.M.A. 117, 13:1063 (Sept. 27), 1941.

Flu Unknowns—Most of what we don't know about the immunology of influenza is glumly paraded for the good of our scientific souls. Though antibodies in the blood and susceptibility to known strains bear some relationship, there is much that can't yet be explained.

RICKARD, E. R., *et al.* The Correlation Between Neutralizing Antibodies in Serum Against Influenza Viruses and Susceptibility to Influenza in Man. Pub. Health Rep. 56, 37:1819 (Sept. 12), 1941.

By Way of Introduction—In a state village for the feeble minded some of the inmates have been immunized against pneumonia and influenza. This first paper tells about the planning and carrying out of what promises to be a most significant demonstration. Unfortunately you must wait for succeeding installments to get the whole story.

SIEGEL, M., AND MUCKENFUSS, R. S. A Study on Active Immunization Against Epidemic Influenza and Pneumococcus Pneumonia at Letchworth Village. Am. J. Hyg. 34, 2:39 (Sept.), 1941.

National Defense Against V. D. —Eight timely papers present as many aspects of the recently aggravated problem of prostitution created by our mobilization of a new army.

SNOW, W. F., *et al.* The Attack on Commercialized Prostitution. J. Social Hyg. 27, 7:317 (Oct.), 1941.

ASSOCIATION NEWS

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Rosario Escobar-Santiago, Fajardo, Puerto Rico, Public Health Nurse, Insular Health Dept.

Johanna J. Schwarte, R.N., M.A., School of Tropical Medicine, San Juan, Puerto Rico, Assistant Professor of Public Health Nursing

Blanche F. Sigman, R.D. 1, Copley, Ohio, Assistant Director of Nurses, Summit County Health Dept.

Grace D. Riegal Spray, C.P.H., 2509 Cold Spring Lane, Baltimore, Md., Public Health Nurse, U. S. Public Health Service

Kathryn L. Strauss, R.N., 23 E. Homestead Ave., Collingswood, N. J., Public Health Nurse, State Dept. of Health

Mary Ellen Sullivan, 212 West H. Park Hill, North Little Rock, Ark., District Nursing Consultant

Jessie B. Sutherland, 40 Cedar St., Belfast, Maine, State Field Nurse, Bureau of Health

Aurora Torres de Selles, R.N., Box 4, San Lorenzo, Puerto Rico, Instructor of Public Health Nurses, Dept. of Health

Josefina Torres-Torres, Ponce de Leon 54, Santurce, Puerto Rico, Public Health Nurse Trainee, Insular Dept. of Health

Grace Unzicker, B.S., 529 E. State St., Trenton, N. J., Director, Visiting Nurse Assn. of Trenton, N. J.

Epidemiology Section

Luis Arana-Segnet, B.S., 41 Padre Isern, P. O. Box 7015, Santurce, Puerto Rico, General Epidemiological Investigator, Dept. of Health

Maria C. Barreras, M.D., 172 Ponce de Leon Ave., Santurce, Puerto Rico, Epidemiologist, Venereal Div., Insular Dept. of Health

Eugene P. Campbell, M.D., 3411 Powelton Ave., Philadelphia, Pa., Assistant Professor of Epidemiology, Univ. of Pa.

Theodore E. Hynson, M.D., M.P.H., State Board of Health, Dover, Del., Acting Director, Div. of Communicable Disease Control

Robert A. MacCready, M.D., 7 Plaza Ave., Stoneham, Mass., Epidemiologist, State Dept. of Health

George A. Sherman, M.D., 504 Cowley Ave., East Lansing, Mich., Director, Bureau of Tuberculosis Control, State Dept. of Health

Evan W. Thomas, M.D., 138 E. 36th St., New York, N. Y., Chief, Syphilis Clinic, Bellevue Hospital

Unaffiliated

Abelardo Garcia-Bird, V.M.D., Box 917, Rio Piedras, Puerto Rico, Veterinary Inspector, Dept. of Health

Fructuoso Sanchez-Castano, M.D., Betances, Vega Baja, Puerto Rico, Medical Director, Venereal Disease Clinic, Public Health Unit

Candida Campos de Cordova, Bayamon, Puerto Rico, Medical Social Work Supervisor, Dept. of Health

Rosario Cucurella-Davila, B.A., Munoz Rivera St., Rio Piedras, Puerto Rico, Senior Supervisor of Social Work in Venereal Disease Clinics, Dept. of Health

John W. Daugherty, M.D., Aguadilla, Puerto Rico, Director, Centro Anti-tuberculosis, Insular Dept. of Health

Maria E. Diaz de Echandi, M.A., De Diego 48, Aguadilla, Puerto Rico, Supervisor of Medical Social Works, Dept. of Public Health

Victor Gutierrez-Ortiz, M.D., Dept. of Health, San Juan, Puerto Rico, Director of Communicable Diseases Hospital

Nellie M. Kolb, B.S., Dr. Cueto, Utuado, Puerto Rico, Medical Social Worker, Public Health Unit

Acacia L. Diaz, B.A., Arzuaga 5, Rio Piedras, Puerto Rico, Area Supervisor, WPA

Antonio Marchany, M.D., Dr. Cuetto St., Utuado, Puerto Rico, Director, Venereal Diseases Clinics

Fred W. Morse, Jr., M.D., M.P.H., 11 Fells Road, Wellesley, Mass., Assistant Professor of Oral Medicine, Harvard Dental School

Alejandro Otero-Lopez, M.D., P. O. Box 1575, Manati, Puerto Rico, Medical Director, Venereal Disease Clinic

Augusto Perea, M.D.C.M., Clinica Dr. Perea, Mayaquez, Puerto Rico, Director, Anti-Tuberculosis Center

Maria Pintado-Rahn, M.A., Villamar Apts., Stop 50, Santurce, Puerto Rico, Associate Professor of Social Work, Univ. of Puerto Rico

Leandro Santos, M.D., Tuberculosis Hospital, Ponce, Puerto Rico, Medical Director

Max Silverstein, B.A., Room 388, Chamber of Commerce Bldg., Los Angeles, Calif., Director, Health Div., Council of Social Agencies

Lilyan Starr, Atlanta National Bldg., Atlanta, Ga., Executive Secretary and Trustee, Ga. State Chapter, National Foundation for Infantile Paralysis

Mildred R. Tully, B.S., 33 Barr St., Salem, Mass., Public Health Education Worker, State Dept. of Public Health

Miguel Zapata, M.D., Arecibo, Puerto, Rico, Director, Anti-Tuberculosis Center of Manati, Dept. of Health

DECEASED MEMBERS

D. C. Bryant, M.D., Claremont, Calif., Elected Member 1916—Unaffiliated.

Dorothy Child, M.D., Philadelphia, Pa., Elected Member 1916, Elected Fellow 1923, Maternal and Child Health Section

Leslie C. Frank, C.E., Rockville, Md., Elected Member 1914, Elected Fellow 1922, Engineering Section

John A. Stevens, M.D., Aliquippa, Pa., Elected Member 1929, Education Section

Roy W. Swope, C.E., Kansas City, Kans., Elected Member 1937, Engineering Section

Watson Frank Walker, Dr.P.H., Bayside, Long Island, N. Y., Elected Member 1915, Elected Fellow 1922, Health Officers Section

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PUBLIC HEALTH PRIORITIES

AT the Atlantic City meeting the Executive Board of the Association discussed at some length the question of priority arrangements for public health agencies. The Board suggested that those in the field of public health who are concerned with this problem should be asked through the *Journal* to communicate with the central office indicating the particular points at which they have had difficulty and passing along any suggestions which may be of value to their colleagues in overcoming these priority problems.

It was the opinion of the Board that shortages in certain essential materials were likely to become more acute as the months go on, and an interest was expressed not only in shortages of supplies to public health agencies themselves but shortages of a kind that interfere with the enforcement of sanitary regulations, as for example shortages of chlorinating equipment, plumbing supplies, pasteurizing equipment and replacements and similar items.

Persons interested in this field are invited to communicate with the Executive Secretary, Reginald M. Atwater, M.D., 1790 Broadway, New York, N. Y.

EMPLOYMENT SERVICE

The Association Employment Service seeks to bring to the attention of appointing officers the names of qualified public health personnel and to act as a clearing house on employment. This is a service of the Association conducted without expense to the employer or employee.

From the registry of persons available, selected announcements are published from time to time. Appointing officers may obtain lists of all registrants on request.

UNASSEMBLED EXAMINATIONS IN WEST VIRGINIA

The Merit System Council of West Virginia, Box 873, Morgantown, has announced that it is expected that unassembled examinations will shortly be given for the following positions in the West Virginia State Health Department.

Position	*Salary per month*
Chief of Medical Services	$325–$400
Ophthalmologist	275– 350
Director of County Health Work	350– 400
Director, Maternal & Child Hygiene	350– 400
Director, Communicable Diseases	350– 400
Director, Vital Statistics	350– 400
Director, Industrial Hygiene	350– 400
Assistant Director, Maternal & Child Hygiene	320– 375
Assistant Director, Communicable Diseases (Venereal)	320– 375
Assistant Director, Tuberculosis	320– 375
Venereal Disease Consultant	320– 375
Senior Health Officer	320– 375
Junior Health Officer	280– 320
Health Officer Trainee	$200

Residence in West Virginia has been waived in consideration of the applications for these positions. However, residents of the state may be given preference in making appointments. Complete information may be obtained by writing to the Merit System Council.

VACANCY IN LOS ANGELES CITY HEALTH OFFICER POSITION

The City of Los Angeles is seeking qualified applicants for the position of City Health Officer paying a salary of $7,200 per annum. While the city charter requires that candidates for this position be residents of the City of Los Angeles if possible, if insufficient competition for this examination is obtained, candidates who do not reside in the city may become eligible if they are otherwise qualified. From the experience of other agencies in this area it is probable that insufficient competition will be obtained and that it will be necessary to waive the residence requirements.

The City Health Officer is the Chief Administrative Officer of the City Health Department and plans and administers a broad public health program, including medical and inspectional services. He is responsible for the proper enforcement of health laws and ordinances and the prevention and control of communicable disease in the city.

Public health physicians who are interested in this position should communicate with the Los Angeles City Civil Service Commission, Room 11, City Hall, Los Angeles, California, for further information.

LOS ANGELES COUNTY

The Los Angeles County Civil Service Commission, Hall of Records, Los Angeles, Calif., has announced a vacancy in the position of Communicable Disease physician in the County Health Department for which an open competitive examination will be held. The usual 3 year county residence requirement is waived. Candidates must be not over 45, graduates from an approved medical school, and have completed at least a one year interneship. A residency experience in communicable disease and in public health work are desirable. Last date for filing the application is November 12. Salary is $2,700.

U. S. CIVIL SERVICE COMMISSION

The Commission has announced that applications will be received for positions as Senior Medical Officer ($4,600), Medical Officer ($3,800), and Associate Medical Officer ($3,200) for appointments in the Public Health Service, with the Food and Drug Administration, Veterans' Administration, and the Indian Service. Forms for application may be obtained from the U. S. Civil Service Commission, Washington.

Junior Public Health Nurse. A civil service examination for Public Health Nurse ($2,000) has been open for some time. Nurses who have been unable to qualify for this examination because of the experience requirement now have an opportunity to qualify through a new Junior Public Health Nurse examination ($1,800) which requires no experience. Applications are also being received for examinations now open for Junior Graduate Nurse ($1,620) and Graduate Nurse for general staff duty ($1,800). Further information and application forms may be obtained at any first or second class post office or from the Civil Service Commission, Washington.

POSITIONS AVAILABLE

Young woman, trained in Home Economics, for group contact work in behalf of an important commercial organization whose products are useful in the protection of public health and the National Nutrition Program. Experience in the public health field or related fields is essential. Office in New York, some travel involved. Write **Box H**, Employment Service, A.P.H.A.

Southern State Department of Health seeks physicians qualified by training and experience as County Health Officers or as Pediatricians. Write **Box B**, Employment Service, A.P.H.A.

Western State Department of Health will consider applications from physicians with experience and a degree in public health. Write **Box S**, Employment Service, A.P.H.A.

Physician with public health training to serve as full-time County Health Officer in rural South Atlantic area. Salary $3,600 to $4,000. Write **Box C**, Employment Service, A.P.H.A.

County Public Health Nurses for New Mexico. Must have four months' postgraduate instruction under one of the recognized public health nursing courses and one year's experience. Must drive and have a car. Address inquiry to State Health Department, Santa Fe, N. M.

Wanted: Trained Public Health Nurse, starting salary $1,500 per year and traveling expense, increase to $1,700 within 6 months. Saginaw County Health Department, Saginaw, Mich.

POSITIONS WANTED

ADMINISTRATIVE

Physician, M.D. Tulane, M.P.H. Johns Hopkins, age 31, experienced as health unit director, prefers administrative position in the South. **A–488**

Physician with M.P.H. from Johns Hopkins 1924, experienced as state director for communicable diseases, as county health officer and as director of field training center, will consider responsible position with good income. **A–483**

Physician, aged 39, excellent graduate training and experience in public health, specialized in tuberculosis and epidemiology, now employed, will consider position with salary of $4,500 or better. **A–473**

Experienced physician, graduate University of Illinois, M.P.H. Johns Hopkins 1940, seeks administrative opening suitable to his proven ability. Excellent references. **A–466**

HEALTH EDUCATION

Teacher and research worker, man, Ph.D., age 52. Extensive record as college professor of biology and hygiene and investigator, for the past two years engaged in research. **H–499**

Woman with M.S. in public health, University of Michigan, and Ph.D. in health education, New York University, experienced in public schools, teachers colleges, and community public health, now employed as health teaching supervisor, will consider position in school, organization, or industry. **H–236**

Young woman with Master's degree in Health Education, Teacher's College, Columbia University, and background of clinical laboratory work and biochemistry, seeks position as health educator in research or as laboratory assistant in public health. **H–494**

Health Educator, Negro, man with

background of High School administration and M.S.P.H. from University of Michigan, seeks position in Health Education. Public agency or educational field. Excellent references. **H–497**

Woman, M.S. in public health, excellent graduate training in education, 8 years' experience as business executive (sales and publicity). Just completed year's research in community education. Seeks good administrative position. **H–496**

Health Educator, M.A. in Education, 10 years' background in community organization for public health education, also teaching of personal and community health at high school and college levels. Public health nurse, able to teach mental and social hygiene as well as general health education. East preferred. **H–498**

Health Educator, man 32, M.S.P.H. with excellent training and varied experience in education and public health. Would expect salary of $3,000. Prefers national or state organization. Excellent references. **H–405**

LABORATORY

Milk Sanitarian and Technologist, age 37, Ph.D. Bacteriology, Wisconsin, 10 years' experience in milk and food sanitation from industrial and official angle, seeks administrative position with opportunity for research or investigational work preferred. **L–381**

Experienced Bacteriologist, man, 56, with long record as successful university teacher, research worker, and head of department of bacteriology and public health, desires new location in educational, research, or public health organization. Available at once. **L–462**

Experienced woman bacteriologist, now employed, graduate Iowa State College 1925, 6 months on Fellowship at Johns Hopkins 1930, wishes position in serology, immunology, bacteriology or research. **L–458**

Experienced laboratory technician. Woman with 17 years in large midwest municipal laboratory. Has 12 years' background in the Kahn test. Excellent references. Immediately available. Will consider any location. **L–460**

Chemist, Sc.D., Biochemistry, Johns Hopkins University. Age 31. Public health laboratory experience, teaching experience. Desires position with promise of advancement, preferably in commercial organization. **L–461**

Pharmacologist. A.B. Johns Hopkins, Ph.D. Maryland 1941. Desires position in public health work. Minors, medicinal and physical chemistry, research experience with sulfanilamide and Vitamin C. Training in bioassay. Publications. Age 29. **L–463**

Laboratory Director, unusually well qualified and experienced man, aged 41, Ph.D. with training at Michigan, M.I.T. and Maryland. Excellent references. Will consider administrative, teaching or research position in public health. **L–459**

Experienced bacteriologist, young man of 33, Sc.B., who for several years has been in charge of state laboratory doing public health and diagnostic bacteriology, immunology and serology, will consider opening. **L–427**

SANITARY ENGINEERING

Engineer, age 38, 3 years' experience as district sanitary supervisor, state department of health, together with work on plumbing, heating and ventilation. Will consider position in the plumbing or heating field or state department of health. Prefers middle western or western states. **E–453**

Public Health Engineer, M.S. Harvard, experienced in public health and industrial hygiene, wishes position of better sort in public health engineering or industrial hygiene. **E–470**

Public Health Engineer, M.S. Harvard, with more than 10 years' experience including 5 years with state division of sanitation, is available. **E–468**

STATISTICAL

Public Health Statistician. Young man, M.S.P.H. Michigan, now employed as supervisor of state health project, experienced in medical research, epidemiology studies and vital statistics, seeks position in city or state health department in Midwest. **S–458**

Woman with academic, business and research experience in vital statistics seeks a position in the vital statistics division of a state or city health department, preferably as registrar. **S–459**

Advertisement

Opportunities Available

PUBLIC HEALTH PHYSICIANS—(a) Health director; midwestern county having population of 30,000; duties include conducting venereal disease clinic; $4,000 plus $500 travel allowance. (b) Health commissioner; county appointment in southern state; physician familiar with health problems of South preferred; $350. (c) Municipal department of health; opportunity for research; tropics. (d) Young physician with flair for public speaking and teaching ability for appointment with national organization; considerable traveling in midwestern states. (e) City physician; southern metropolis; $300. PH11-1, Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago.

STUDENT HEALTH PHYSICIANS—(a) For student health service of western university; appointment carries rank of assistant professor; teaching duties would include assisting in course of physical diagnosis for medical students and courses in hygiene for liberal arts students. (b) Physician for student health department; southern university; $3,000, maintenance; woman physician eligible. PH11-2, Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago.

PUBLIC HEALTH NURSES—(a) Public health nursing supervisor; minimum year's training public health, two years' experience required; $1,920, mileage; state department of health; West. (b) Public health nurse qualified to integrate public health in basic program of university school of nursing; $125, maintenance; East. (c) Public health nurse for state department of health; applicant with one, two, or three years' experience eligible; $140–$150. (d) County health nurse; $1,500–$1,700, travel allowance; Midwest. PH11-3, Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago.

SCHOOL NURSES—(a) To take charge of infirmary, select school for young women of preparatory and junior college age; applicant must be adaptable to college environment; South. (b) For high school appointment; graduate nurse with degree, unmarried required; $1,250–$3,100, depending upon experience; Chicago area. PH11-4, Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago.

OUTPATIENT DEPARTMENT NURSES—(a) Assistant director of nursing service, outpatient clinic of university hospital; appointment carries rank of assistant professor of nursing; $125, complete maintenance; South; (b) Outpatient department nurse; large hospital near New York City which has recently moved into new enlarged quarters; postgraduate training public health required. PH11-5, Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago.

BACTERIOLOGIST—Well qualified bacteriologist is needed for municipal health department; minimum requirements include Bachelor's degree with major in bacteriology and two years' subsequent experience in public health bacteriological work; about $150, to begin; Midwest. PH11-6, Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago.

Situations Wanted

PUBLIC HEALTH PHYSICIAN—B.S., M.D. degrees, state university; M.S.P.H., University of Michigan; several years' successful general practice, including part-time health appointment; four years' administrative experience with state department of health. PH11-7, Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—B.S. degree, state university, with major in public health nursing; eight years' experience in tuberculosis and public health nursing; served as director of visiting nurse association for several years; taught in public schools before entering training school; age 36; will go anywhere. PH11-8, Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—Fairly recent graduate of midwestern training school; certified public health nurse; will receive special teacher's certificate upon completion present courses in university medical school. PH11-9, Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago.

NEWS FROM THE FIELD

PUERTO RICO PUBLIC HEALTH ASSOCIATION ORGANIZED

AN association of public health workers and others interested in public health was organized in San Juan September 23 at a meeting attended by about 200 persons representative of all specialties to be found in the Island. There were 116 active Charter members, all of them identified with the American Public Health Association, with which it is expected that the Puerto Rico Public Health Association will become affiliated.

Officers elected include:

President, E. Garrido Morales, M.D., Dr.P.H.*
President-elect, Pablo Morales Otero, M.D.†
Vice-President, Jose Chavez, M.D.†
Treasurer, Kathleen M. Logan, R.N.*
Secretary, Guillermo Arbona, M.D., M.P.H.†
Representative to A.P.H.A. Governing Council, Oscar Costa Mandry, M.D.*

In addition to the officers, the new Board of Directors includes:

Thomas H. D. Griffitts, M.D.†
Ezequiel Martinez Rivera, M.D.†
Ernesto Quintaro, M.D.
Mary Rahn
Johanna J. Schwarte, R.N.

More than 100 persons in Puerto Rico applied for membership in the A.P.H.A. through the new organization, a record number, it is believed, for a new local association. Dr. James A. Doull of Western Reserve University, Cleveland, O., was Chairman of the provisional organization committee. Other A.P.H.A. Fellows and members from the continental United States who participated in the meetings include Myron D. Wegman, M.D., Charles T. Wright, James Watt, M.D., Dr.P.H. Richard H. Fletcher, M.D., M.P.H., John M. Henderson, C.E., Thomas H. D. Griffitts, M.D., Kathleen M. Logan, R.N., Joseph Dean, M.D., and Reginald M. Atwater, M.D., Dr.P.H.

The meetings were held in the School of Tropical Medicine, San Juan, of which Dr. Pablo Morales Otero is the Acting Director.

KANSAS STATE HEALTH ASSOCIATIONS

THE joint annual meeting of the Kansas Tuberculosis and Health Association and the Kansas Public Health Association was held in Emporia, Kans., September 17–18.

All officers of the Kansas Tuberculosis and Health Association were re-elected including:

President—C. E. Coburn, M.D., Kansas City
Executive Secretary—Charles H. Lerrigo, M.D.
Vice-Presidents—F. A. Trump, M.D., Ottawa; Luella Taylor, Independence
Treasurer—T. C. Mueller, Topeka

The Kansas Public Health Association elected the following officers:

President—F. E. McCord, M.D., Shawnee County Health Officer
Vice-President—H. H. Asher, M.D., Sedgwick County Health Officer
Secretary—Richard F. Boyd, M.D., Director of Local Health Services for the Kansas State Board of Health
Treasurer—F. C. Beelman, M.D., Acting Secretary and Executive Officer of the Kansas State Board of Health

The Kansas Public Health Association had its inception April 1, 1940, when a conference of county and city health officers was held in Salina. Officers were elected; it was decided to hold the meetings semi-annually; and at the meeting held the following October, a constitution and by-laws were adopted, and officers elected at the previous con-

* Fellow A.P.H.A.
† Member A.P.H.A.

ference were inducted as officers of the newly organized Kansas Public Health Association. The meeting held recently in Emporia was the fourth session.

NEW HEALTH COURSES AT MASSACHUSETTS STATE COLLEGE

IN coöperation with the Massachusetts Department of Public Health, Massachusetts State College at Amherst will offer for the first time this academic year a series of courses in public health subjects for undergraduate and graduate students. Dr. Leon A. Bradley, Head of the Department of Bacteriology, will direct the special courses of study.

The undergraduate work will be given in a 4 year course leading to the Bachelor of Science degree, with general scientific and cultural courses concentrated in the first two years and specialized courses in the last two academic years. The advanced studies will include lectures, recitations and laboratory work in the several branches of local, district, and state public health work. Graduate courses for those with Bachelor of Science degrees from this and other accredited colleges will be given, leading to the issuance of a suitable certificate of proficiency in the chosen field upon the completion of an additional year of academic work. At present, no "short courses" will be offered.

These courses will prepare men and women without medical or nursing training for responsible positions in state, municipal, and county health departments in capacities such as administrative worker, sanitary inspector, laboratory technician, and water and sewage plant operator. The academic faculty will be supplemented by the staff of the Massachusetts Department of Public Health and local health departments, working through the departmental sanitary engineering and medical representatives at Westfield, Mass., C. I. Sterling, Jr., and Dr. Charles E. Gill.

UNIVERSITY OF OREGON MEDICAL SCHOOL CREATES FULL-TIME DEPARTMENT IN PREVENTIVE MEDICINE AND PUBLIC HEALTH

DR. RICHARD B. DILLEHUNT, Dean of the University of Oregon Medical School, has announced the creation of a full-time Department of Public Health and Preventive Medicine with Dr. Adolph Weinzirl as Professor and head of the department. Dr. Weinzirl has served during the past 4½ years as Health Officer of Portland, Ore., and previously as director of communicable disease in the Baltimore City Health Department. Dr. Weinzirl is a graduate of the University of Oregon Medical School and has an M.P.H. degree from Johns Hopkins School of Hygiene and Public Health.

CUTTER LECTURE

THE Cutter Lecture on Preventive Medicine was delivered on October 22 at the Harvard Medical School by Sir William Wilson Jameson, Chief Medical Officer, Ministry of Health, London, England. The subject was "Public Health in Britain at War."

These lectures are given annually under the terms of a bequest from John Clarence Cutter, M.D., whose will provided that the lectures so given should be styled the Cutter Lectures on Preventive Medicine and that they should be delivered in Boston and be free to the medical profession and the press.

FEDERAL AID IN TRAINING NURSES

EIGHTY-EIGHT schools of nursing selected by the U. S. Public Health Service to receive federal aid in training additional student nurses have been named by Surgeon General Thomas Parran.

Sixty-seven schools in 32 states will offer refresher courses to 3,000 graduate nurses and 26 schools will enroll 500 graduate nurses for post-graduate study. A total of $1,200,000 is available for

the program, which includes field training centers for public health nursing.

The student-nurse training program will increase enrollment by 2,000 young women in this country, Hawaii and Puerto Rico. It is estimated that there is a need for 50,000 student nurses this year, and the federal program will bring the total to about 42,000. The average yearly enrollment is slightly under 40,000. It is hoped schools able to increase their enrollment without federal aid will meet the deficiency.

LOYOLA UNIVERSITY

THE Department of Preventive Medicine, Public Health and Bacteriology, Loyola University School of Medicine, Chicago, Ill., has received a grant of $4,450 for the expansion of its facilities for the field training of students in public health nursing.

HARBEN LECTURES

PROFESSOR E. V. McCOLLUM of the School of Hygiene and Public Health of the Johns Hopkins University, will deliver the Harben Lectures of the Royal Institute of Public Health and Hygiene of London, England, for the year 1941. Owing to war conditions the University of Toronto has been designated for the delivery of the lectures, which will be given on December 1, 2, and 3. The subjects of the lectures are: "Nutritional Science and Public Health"—(1) Inorganic elements which present nutrition problems of practical importance; (2) Problems presented by the availability of low-cost synthetic vitamins — enrichment, fortification and restoration of refined foods; (3) Nutrition problems presented by low-income families.

INDUSTRIAL HYGIENE COURSE

IN order to provide trained industrial hygienists to meet the needs of expanding health and safety services in the defense industries, the University of Pennsylvania offers a course of instruction, of 12 weeks' duration, in industrial hygiene.

The course will be given under the auspices of the Engineering, Science and Management Defense Training Program of the U. S. Office of Education and is open to graduates in engineering, chemistry, or allied sciences.

The course runs from October 27, 1941, to January 17, 1942. Applications for admission to the course should be addressed to: Theodore Hatch, Associate Professor of Industrial Hygiene, Department of Public Health and Preventive Medicine, University of Pennsylvania, Philadelphia, Pa.

INDUSTRIAL HYGIENE FOUNDATION OF AMERICA

THE Board of Trustees of Air Hygiene Foundation of America, Inc., has announced the change of the organization's name to Industrial Hygiene Foundation of America, Inc. The Foundation was originally set up in Ohio in 1935 but has been reincorporated under the laws of Pennsylvania. The new name more clearly describes the Foundation's activities and services for the protection of employee help.

When the Foundation was organized its first emphasis was placed on silicosis. Current literature on health is digested by the Foundation for the information of its members covering about 300 journals. Industrial hygiene laboratory facilities are also maintained at the Mellon Institute. The Foundation maintains industrial hygienists in the field, making surveys for member companies. Its function is to help keep precautions apace with production for its member companies and their million workmen.

ALABAMA FELLOWSHIP IN PUBLIC HEALTH OBSTETRICS

THE Alabama State Department of Public Health, in coöperation with the Children's Bureau of the U. S.

Department of Labor, announces fellowships in public health obstetrics for physicians who have had a minimum of a year's rotating internship and one year of obstetric training. Training provided will embrace field work in already established maternity clinics in rural areas; in the organization of new centers and rotating through the various departments and projects connected with the obstetric aspects of public health. A stipend of $150 a month, plus travel while in the field, is provided. Applications should be sent to Dr. J. N. Baker, State Health Officer, Montgomery, Ala.

EIGHTH PAN AMERICAN CHILD CONGRESS

THE Eighth Pan American Child Congress will be held in Washington, D. C., May 2 to 9 under the auspices of the United States Government. Miss Katharine F. Lenroot, Chief of the Children's Bureau, U. S. Department of Labor, is Chairman of the Organizing Committee.

This Congress has been arranged in accordance with the unanimous recommendation of the Governing Board of the Pan American Union, meeting in November, 1940, and with the recommendation of the Council of the International American Institute for the Protection of Childhood. An Act of Congress implementing the Child Health Congress was passed April 1, 1941.

The Eighth Congress will be divided into three sections on Health Protection and Medical Care, on Education and Recreation and on Economic and Social Services for Families and Children. Official delegates will be appointed by the governments represented in the Congress. Individual members will be representatives of government agencies and private associations and other persons engaged in work related to the health, education, or welfare of children.

CUBAN PUBLIC HEALTH ASSOCIATION

THE Cuban Public Health Association, Havana, has announced the election on August 28 of the following officers:

President: Dr. Antonio Diaz Albertini
Technical Director: Dr. Domingo F. Ramos
2nd Tech. Director: Dr. Alberto Recio y Forns
Treasurer: Dr. Hugo Roberts y Fernandez
Technical Secretary: Dr. Horacio Abascal y Vera
Administrative Secretary: Dr. Jose F. Rodriguez-Perez
Representative to the A.P.H.A. Governing Council: Domingo F. Ramos, M.D.

The Cuban Public Health Association (Sociedad Cubana De Salubridad Publica) is an affiliated society of the American Public Health Association.

PERSONALS

Central States

MAUDE CARSON, R.N., has been appointed Chief Supervising Nurse of the Division of Public Health Nursing of the State Health Department of Illinois. This is a new division created recently because of the expanded activities of the Health Department.

MAURICE KAMP, M.D., who is on loan from the U. S. Public Health Service to the Indiana State Board of Health, is now Director of District No. 3, Health Department, Albany, Ind.

CHARLES K. KINCAID, M.D.,† former Director of District No. 3, in southern Indiana, has been appointed Director of the Au Claire City-County Health Department, Au Claire, Wis.

CHARLES H. MANN, M.D., Dr.P.H.,† formerly associated as Instructor in Hygiene and Public Health, University of Michigan, Ann Arbor, Mich., has been appointed Director of Local Health Service with the Idaho State Department of Public Health, Boise, Idaho.

* Fellow A.P.H.A.
† Member A.P.H.A.

ARTHUR B. MORRILL, engineer of sewage treatment with the City of Detroit, Mich., has been granted a year's leave of absence to supervise camp sanitation along the Burma Road in China. Mr. Morrill, who will leave this month for China, will be employed by the U. S. Public Health Service and will be Senior Sanitary Engineer with the Burma-Yunnan Railway Medical Commission.

CARL SCHWOB† has resigned as District Engineer of the Ilinois State Board of Health, Chicago, Ill., to join the Yeoman Brothers Company, Chicago. Mr. Schwob figured prominently in the cleanup of the typhoid epidemic at the Manteno State Insane Hospital in 1939.

GRACE S. WIGHTMAN, M.D.,† has been appointed Chief of the new Division of Maternal and Child Hygiene of the Illinois State Health Department. This Division was recently formed because of expanded activities of the Health Department.

Eastern States

HENRIETTA LANDAU,† formerly with the Public Health Nursing staff in New York State, has been appointed Public Health Nursing Consultant with the U. S. Public Health Service for District 3 with headquarters in Chicago, the district including Illinois, Indiana, Kentucky, Michigan, Ohio and Wisconsin.

JOSEPH I. LINDE, M.D.,* Health Officer of New Haven, Conn., who was appointed to complete the unexpired term of the late DR. JAMES STEPHEN MAHER on the State Tuberculosis Commission, has now been appointed to a regular term of six years by Governor Hurley.

WILLIAM J. MCCONNELL, M.D.,* Assistant Medical Director, Metropolitan Life Insurance Company, New York, N. Y., reported for duty as consultant to the Division of Industrial Hygiene, National Institute of Health, Bethesda, Md. He will direct the procedure to be used in the nation-wide survey of present-day medical service facilities in industry.

CHARLES L. POOL, Lt. Commander, Civil Engineer Corps, U. S. Naval Reserve, Chief Engineer, State Department of Health, Providence, R. I., has been called to active duty at the Naval Operating Base, Norfolk, Va.

CHARLES F. WILINSKY, M.D.,* Director of Beth Israel Hospital, Boston, Mass., received the honorary degree of Master of Arts from Harvard University.

Southern States

D. S. ABELL, Principal Assistant Engineer of the North Carolina State Board of Health, has left that position to become Chief Engineer and Director of the Bureau of Sanitation in the Alabama Department of Public Health. Mr. Abell served nine years with the North Carolina Department.

R. L. CHERRY, M.D., M.P.H.,* formerly Director of the Tyler-Smith County Health Unit, Tyler, Tex., has been appointed Field Director of Local Health Services, State Department of Health, Austin.

ALBERT S. J. CLARKE, M.D., of Ozark, Tex., has been transferred to Monticello to be Health Officer of Drew County.

BENJAMIN M. DRAKE, M.D.,† Kenansville, N. C., has resigned as Health Officer of Duplin County, to accept a position in the Moore County Health Department.

JOHN H. FINN, M.D., of Refugio,

* Fellow A.P.H.A.
† Member A.P.H.A.

Tex., was recently appointed Health Officer of Refugio County, succeeding DR. HADDON B. WOODS, who has been called to service in the Army.

LLOYD H. GASTON, M.D.,† of the U. S. Public Health Service, has been assigned to work in Oklahoma as part of the coöperative policy in defense areas.

HUGH H. HAWLEY, JR., M.D., Anadarko, Okla, has been appointed Health Officer of the Caddo County Health Department.

LYNWOOD B. JONES, M.D., formerly Health Officer of Monticello, Tex., has been changed to Ozark as Health Officer of Franklin County.

MASON G. LAWSON, M.D.,† of Benton, Tex., has been appointed Health Officer of Miller County, Texarkana.

EDNA LEWIS,† former Associate Professor of Nursing Education at George Peabody College, Nashville, Tenn., has been appointed Director of Public Health Nursing in the Department of Preventive Medicine, Public Health and Bacteriology, Loyola University, Chicago, Ill. Miss Lewis succeeds DR. DOROTHY ROOD.

MILNER C. MADDREY, M.D., Health Officer of Roanoke Rapids, N. C., resigned. He is succeeded by DR. ROBERT M. BARDIN.

SYLVESTER S. MUNGER, M.D., has been named City Health Officer of Marlin, Tex.

WILLIAM HARVEY PERKINS, M.D.,† Professor of Preventive Medicine at Tulane University, New Orleans, La., has been appointed Dean of Jefferson Medical College, Philadelphia, succeeding the late HENRY K. MOHLER, M.D.

HAROLD C. SHILLING, M.D., Fort Worth, Tex., has been made Director of the Hunt County Health Unit.

LOWELL L. STOKES, M.D., Anadarko, Okla., Health Officer of the Caddo County Health Department, has been placed in charge of a newly created unit in Okmulgee County.

BENNETT A. WIGHT, M.D., Kermit, Tex., has been placed in charge of the Gregg County Health Department.

HENRY C. WILSON, M.D.,† of Greenville, Tex., has been appointed Health Officer to the Tyler-Smith Counties Health Unit.

Western States

JACK C. HALDEMAN, M.D.,† recently Health Officer of Wasco County, Ore., with headquarters in The Dalles, has been appointed to take charge of a new Health Unit in Christian County, Ky.

EDWIN H. JORRIS, M.D.,† recently a Health Officer, with headquarters at Sparta, Wis., has been made Director of the Tuberculosis Division in the State Department of Health.

WALTER S. KOTAS, M.D., formerly of Greybull, Wyo., has been appointed Director of the Cheyenne and Laramie County Health Unit.

ERNEST NEWMAN, M.D.,† of Wausau, Wis., has resigned as Director of the Health Unit of Marathon County to join the U. S. Public Health Service.

Hawaii

MARY H. LEMON,* Registrar General of Vital Statistics, Board of Health, Honolulu, is retiring from Public Service in Hawaii.

DEATHS

W. FRANK WALKER, Dr.P.H.,* Director of the Division of Health Studies of the Commonwealth Fund, New York, N. Y., died September 27.

EDGAR WHEDBEE, a sanitary engineer employed in the Waterworks Department of the City of Dallas for the last 15 years, died in Bonham, Tex.

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* Fellow A.P.H.A.
† Member A.P.H.A.

CONFERENCES AND DATES

American Association for the Advancement of Science. New York, N. Y. December 28–January 2.

American Library Association — Midwinter Conference. Chicago, Ill. December 28–31.

American Public Welfare Association—Round Table and Annual Meeting. Washington, D. C. December 12–14.

American Society of Heating and Ventilating Engineers—Seventh International Heating and Ventilating Exposition. Commercial Museum, Philadelphia, Pa. January 26–30, 1942.

American Society for Public Administration. New York, N. Y. December 27–30.

American Statistical Association. New York, N. Y. December 27–31.

American Water Works Association—

North Carolina Section—Sheraton Hotel, High Point, N. C. November 3–5.

Four States Section—Lord Baltimore Hotel, Baltimore, Md. November 6–7.

Florida Section—Osceola Hotel, Daytona Beach, Fla. November 13–15.

New York Section—Hotel Commodore, New York, N. Y. December 30.

Child Study Association of America. Hotel Commodore, New York, N. Y. November 14–15.

Colorado Public Health Association. La Junta, Colo. November 7–8.

Florida Public Health Association. Orlando, Fla. December 4–6.

Illinois Public Health Association. Springfield, Ill. December 4–5.

Michigan Public Health Association. Grand Rapids, Mich. November 12–14.

National Municipal League — 47th Annual Conference. St. Louis, Mo. November 17, 18, and 19.

National Society for the Prevention of Blindness. New York, N. Y. December 4–6.

New Jersey Health and Sanitary Association, Inc.—All-day conference at the Stacy-Trent Hotel, Trenton, N. J., December 5.

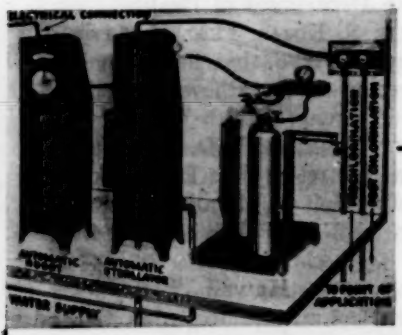
Texas Public Health Association. Corpus Christi, Tex. November 3–5.

West Virginia Public Health Association. Charleston, W. Va. November 17–19.

Foreign

Pan American Medical Association—8th Congress. Buenos Aires, Argentina. 1941.

Pan American Conference of Directors of Public Health—4th. Rio de Janeiro, Brazil, 1942.



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